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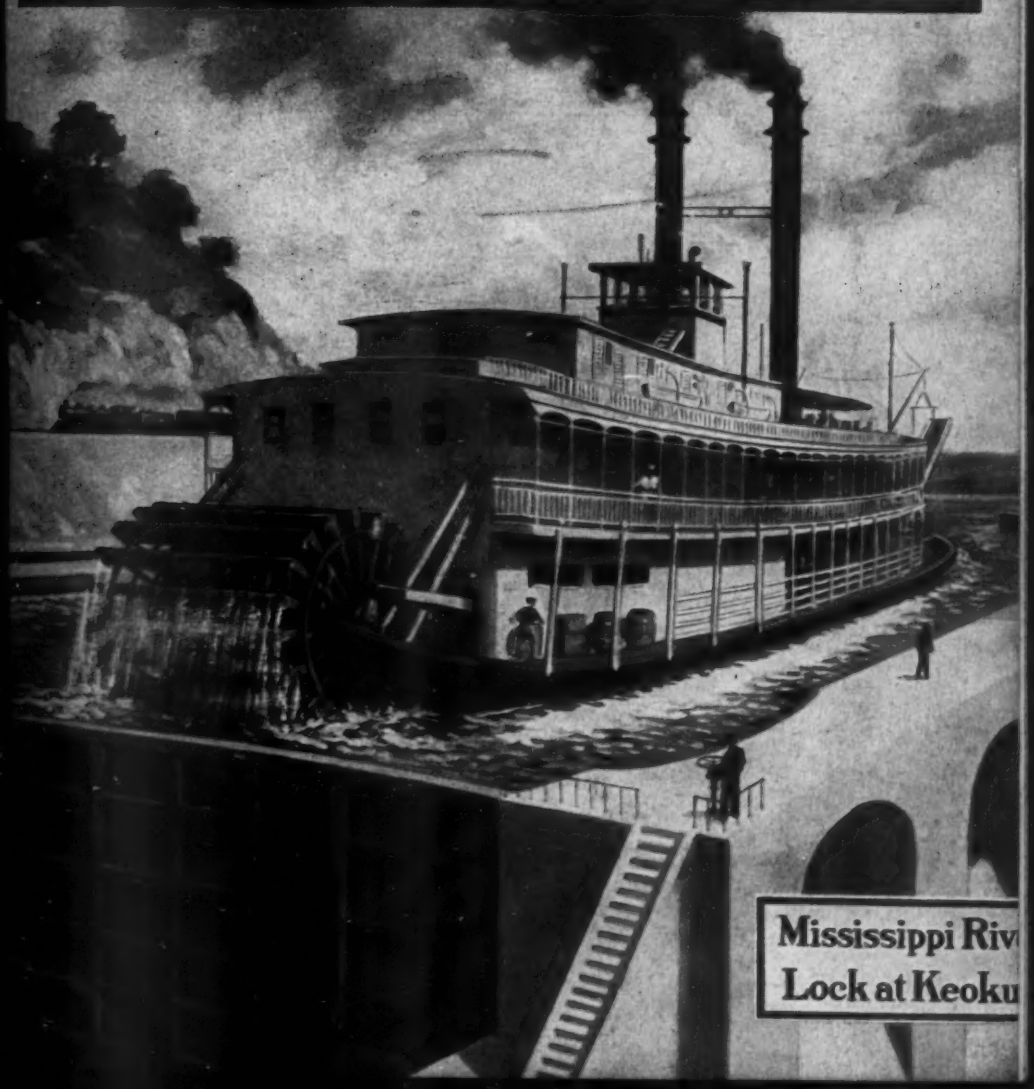

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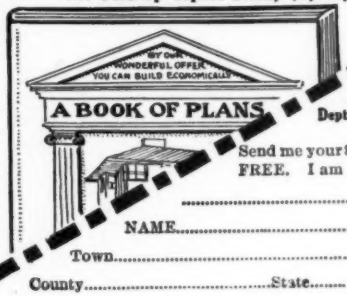

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Popular Mechanics Magazine

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EDITED BY H. H. WINDSOR

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Articles failing to win one of the prizes, but suitable for publication will be promptly paid for at usual rates; all others will be returned.

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Popular Mechanics Magazine

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$10 for the Best Contribution
$5 for the Second Best

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Quality, not length counts.

Checks will be sent on the last day of each month for the prize articles received during that month. Publication in the magazine will follow in about two months.

PRIZES AWARDED FOR JANUARY, 1913

First Prize—M. J. McGALL, W. Orange, N. J. $10
"Magnetic Plumb-Line Holder"

Second Prize—F. L. MATTER, Portland, Ore. $5
"Indicator for a Mail Box"

EXTRA AWARD

On account of there being five contributions this month each of which deserved second prize, we have made an EXTRA AWARD of four additional second prizes, as follows:

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J. L. SEARS, Waverly, Ill. $5
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WM. JENKINS, New York City $5
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All accepted contributions to our departments, "SHOP NOTES" and "AMATEUR MECHANICS," are paid for immediately; checks for prize awards are sent at the end of each month.

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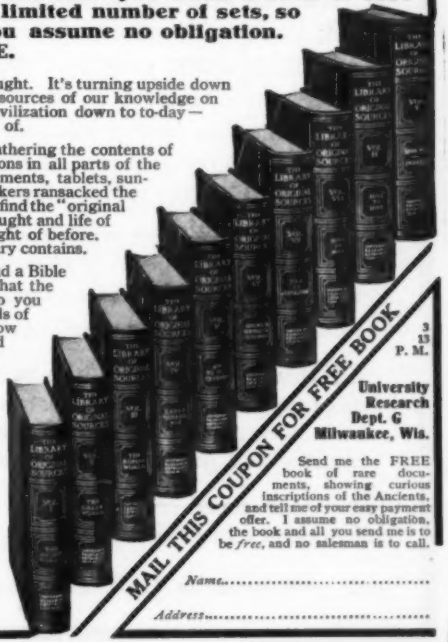

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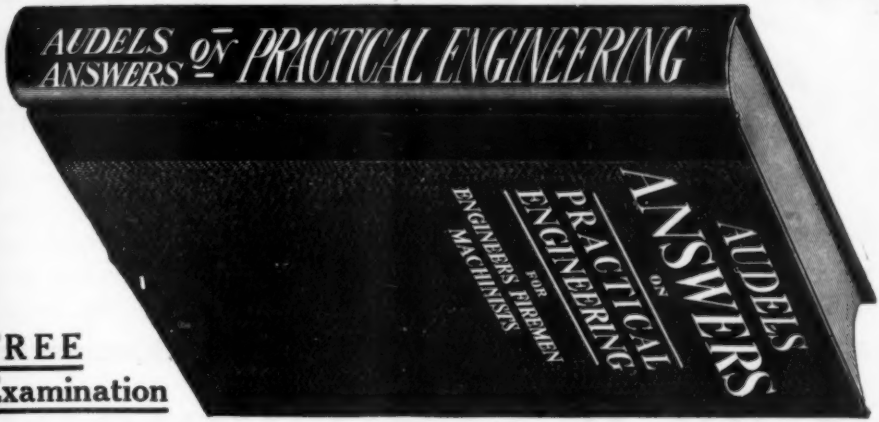

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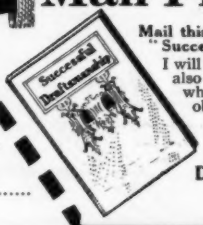

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I ORIGINATE and write Pulling Advertising Matter. Geo. R. Hoagland, 517 Main, Kansas City, Mo.

BLACKSMITHS

SHOP Notes—Many valuable kinks for blacksmiths are contained in our series of Shop Notes books, 9 volumes, 50c each postpaid or $4.50 per set prepaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

BLACKSMITHS — Learn hand-wrought ornamental ironwork. Our 200-page book "Hand Forging" points out clearly all the guiding principles and methods which underlie all forge work. Written by a practical authority. 122 illustrations, cloth, $1 postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

BLACKSMITHS—Here is your opportunity to be an expert blacksmith without help as life is short. Try Toy's Modern Methods doing hard jobs easy. Forging and welding all kinds of steel solid, and tempering and hardening all tools to a standard by colored charts. This is real information, not theory. All for one dollar. Send for free samples. W. M. Toy, Sidney, Ohio.

BUSINESS OPPORTUNITIES

A WELL known mail order wholesale house offers to establish a number of ambitious men in high class mail order enterprise based on soundest business principles; small investment; will coach fully. Sample, with complete advertising specimens and dealers' proposition, sent for twelve cents postage. Bixby Publishing Company, Box E 134, Buffalo, N. Y.

AMBITIOUS men, you want to make more money. Have plan by which you can double your earnings. No canvassing. Write for free booklet "Within Your Reach." M. Robinson, Box 2063, Montreal, Canada.

BE Your Own Boss. Start mail order business. We teach you. 20 years established. Everything furnished. "Starter" free. Krueger Co., Dept. 2B, 167 W. Washington, Chicago.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Mutual Opportunities Exchange, Buffalo, N. Y.

SEND us $1 and we will send you our complete course in Show Card Writing. Quickest, easiest and best course on the market, absolutely thorough. Satisfaction guaranteed or money refunded. Mercantile Training School, Wilkes-Barre, Pa.

ZIM'S plan will start you in a big paying business of your own. 100 different ways. Particulars free. Zimmerman, 1016 Oakdale Ave., Chicago.

FORM a corporation—Congress Law for D. C. and all states; cheap. Raise money easily. U. S. Legal Corporation, Washington, D. C., representing $1,225,000,000.

I MADE $50,000 in five years with a small mail order business; began with $5. Send for free booklet. Tells how. Heacock, 5074 Lockport, N. Y.

AN intelligent person may earn $100 monthly corresponding for newspapers. No canvassing. Send for particulars. Press Syndicate, 700 Lockport, N. Y.

FAMILY Knife and Fork Cleaner made of cork, felt and steel. Sells like wildfire. One dozen postpaid 70c, sample 10c. Baur, 135 East 34th, New York.

INCORPORATE free; pay expenses; we take stock for services. Listed Securities Co., Elmira, N. Y.

TRIAL Offer: $1 places your 25 word ad in 200 different magazines. Send copy now. King's Magazine, Box 13P, Little Silver, N. J.

144 PENCILS with your 4-line ad, $1.90, prepaid. Crescent Pencil Co., Thibodaux, La.

LEARN Sewing Machine Repairing. Easily learned, well paying business. Complete course $3, particulars free. Leroy Brown, 1216 E. Madison St., Baltimore, Md.

WILL point the way to $50 to $100 weekly in business of your own. Booklet. Stamp appreciated. Boyd, Suite 209, Gaiety Theatre Bldg., N. Y.

NEW list of 1722 ladies' names for sale. Price $5.00. S. D. Alliday, Coushatta, La.

YOUNG Man, would you accept and wear a fine tailormade suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use $5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000 write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 163, Chicago.

"LEARN Something"—"Be Something." Complete course in Modern Bookkeeping, Penmanship, Banking, Letter-writing, etc. All sent postpaid $1. Williams Company, 721 Dearborn Ave., Chicago.

RESILVER mirrors and make plenty of money. Full instructions, 25 cents. Auburn Supply Co., Dept. CC, 7740 Peoria St., Chicago.

TURN your spare time into money. Join us in a profitable mail order business, one that you can operate at home. Large profits; quick returns; small investment. Our 10 years' successful manufacturing experience, personal assistance and new ideas assures you success. Write for positive proof and free booklet. Pease Mfg. Co., incorporated, 144-148 Broadway, Desk A, Buffalo, N. Y.

TRY this—your name in our syndicate magazine directory three issues 25c. Big mail for you and the latest propositions. Results guaranteed. Copy of magazine 10c. The "Lever" Mail Trader, 44, Elizabeth, N. J.

WE help raise capital at once to start you in retail—manufacturing—patent—real estate—mail order or any legitimate business by means of "Our Practical Method." Particulars 10c. The Business Aid Co., K-514, Detroit, Mich.

DO your own gold plating at home. Earn big money spare time; process very simple; expense small. 25c stamps brings full instructions. L. D. Pearce, 166 Woodworth Ave., Yonkers, N. Y.

EARN $75.00 to $150.00 monthly. Learn Show Card Writing. Our Complete Course teaches you. Very simple. Regular price $30.00. Splendid offer now $5. Profitable Service Bureau, 4333 N. Sawyer Ave., Chicago.

$3000 IN your back yard starting with a few boxes. No ginseng or mushroom dope. Send for Back Lots Scheme Circular. Metz, P. O. Box M 87, Times Sq. Station, N. Y.

PLEASANT spare time work, mailing circulars. Good pay. No scheme. Instructions free. Home Pub. Society, 1217 Market St., Philadelphia, Pa.

$40 WEEKLY manufacturing Post Cards. Stamp brings particulars. This is no fake. Grandon, Jackson, Mich.

MAIL order and home work. No canvassing. Big money easily earned. Particulars free. Adam Fisher Mfg. Co., 6124 Pierce, St. Louis, Mo.

ENCYCLOPEDIA of Business Chances. Money making methods exposed; how small ventures lead to wealth; 2,000 trade secrets, etc. Descriptive booklet free. Relmel & Co., 96 Broadway, N. Y.

SOMETHING New. Parcel Post Handbook, map, regulations, rules for finding rates by zones. Big profits, retails 50c. Free circulars. Sample and full particulars 15c. J. Julian & Co., Dept. J, 110 Mott St., New York.

$300 MONTH, Five years, no canvassing, mail order or scheme. Absolutely New and Exclusive. Box 4, Ft. Scott, Kan.

INCORPORATE your business under Arizona laws. Cost small. No franchise tax. Stockholders exempt from corporate debts. Do business anywhere. Laws and forms free. Southwestern Securities & Investment Company, Box D488, Phoenix, Arizona.

BIG Money quickly and surely made. Send stamp for descriptive circular. No fake. Address Box 1301, Vermillion, S. D.

PATENTABLE ideas wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Washington, D. C.

AGENTS to sell popular priced stationary vacuum cleaners. Koch Vacuum Machine Co., Troy, O.

MAKE and Sell Mission Furniture—From our instructions one man who was an amateur made and sold $400 worth of just one article alone. We give you 98 designs and easily followed directions for making each piece in 3 books at 50 cents each or $1.50 per set, postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

LEARN Electroplating—Practical results may be obtained by following the directions in our book on electroplating. This is a working guide for the beginner written by an old hand at the business. 112 pages, 62 illustrations, cloth, 50 cents postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

START a business; twenty new moneymaking plans. Worth $1. Sample copy 10c. Harold Hartzman, Moline, Ill.

CAN you invest from $75 to $500 in a sure, permanent, independent and highly remunerative business? Write Adam Fisher Mfg. Co., 6126 Pierce, St. Louis, Mo.

"THE Art and Process of Dry Cleaning." A fascinating and profitable occupation. 25 cents postpaid. Auburn Supply Co., Dept. EE, 7746 Peoria St., Chicago.

SPECIAL Business Opportunity. Wanted—Superintendent or Sales Manager; Machine Shop and Foundry; Modern equipment. 3 New, Profitable, Special lines, besides regular established trade. Do not apply unless educated and a practical Machine and Foundry man. Good salary; fine opening for right man, who can secure interest if he desires. This advertisement will appear but once. Address: W. D. Puckett, Portsmouth, Ohio.

FREE! $5.00 Business Plan complete, with two issues of Good Results—Greatest Mail Order Magazine published for 10c. Publishers, 2311PM, North 43rd Ave., Chicago.

THE "Art and Process of Dry Cleaning" will teach you the business. 25c. Profitable Service Bureau, 4333 N. Sawyer Ave., Chicago.

WE Start You in Business, furnishing everything; men and women, $30.00 to $200.00 weekly operating our Original "New System Specialty Candy Factories;" home or small room anywhere. Opportunity lifetime; booklet free. W. Ragsdale Co., East Orange, N. J.

AGENTS—New invention, Aluminum Cigar Lighter. Used on cigar cases. Quick seller to Hotels, Drugstores, Restaurants, Poolhalls, Cafes. Big profits. Special offer. Drake Mfg. Co., 142 Reed St., Milwaukee, Wis.

AGENTS—A big new moneymaking proposition. Write today. Williams-Crosby Co., 2728 Wabash Ave., Chicago.

SELL your formulas, ideas, plans and knowledge by mail. Some make $1,000 monthly. Instructive booklet for stamp. Information System, 289, Marietta, Ohio.

MAKE More Money! Operate a good, substantial Mail Order business—our "Silent Salesman" system—can easily be done in spare time yet the possibilities are unlimited! For years "Booster" has actually and accurately led thousands like you over the Successful Road to Wealth. To succeed you've got to read The Booster Magazine for "Boosters" is Opportunity and starts you in business for yourself—tells you how to get the dollars—puts you next to the best money making propositions on earth—ones that really get You the money! Send 10c for two months' trial subscription. Booster Magazine, Northwestern Building, Chicago.

BE your own Boss. We show you how. Outfit 25 cents. Sip Manufacturing Company, Jersey City, N. J.

SPARE time is your opportunity to make money. Operate mail order business. Only small capital required. Big profits. I can help you. I furnish advertising assistance and teach you all about the business. Success certain. Free booklet explains. Winfield Jukes, Dept. M, 908 Walnut St., Philadelphia, Pa.

MAIL Order Adviser, chuck full of practical information of the better kind. A truthful reference book. Instructs and advises. Investigates any proposition. Free aid and business departments. Getting agents, orders, selling plans, business management, etc. A high grade scientific journal. One dollar a year, ten cents a copy. Prospectus free. Mail Order Adviser, 2312 N. 12th St., Philadelphia, Pa.

WE start you in a permanent business with us and furnish everything. We have new, easy selling plans and seasonable leaders in the Mail Order line to keep factories busy. No canvassing. Small capital. Large profits. Spare time only required; personal assistance. Write today for (copyrighted) plans, positive proof and sworn statements. J. M. Pease Mfg. Company, 541 Pease Bldg., Main Street, Buffalo, N. Y.

NON-BREAKABLE Pens; complete outfit 25c if you accept agency. Non-Breakable Pen Co., Albany, N. Y.

MAIL order business. I start you free. P. Newnham, Waukegan, Ill.

DO your own French Dry Cleaning. The only most complete book of its kind, contains formulas for removing spots. A copy of this book mailed postpaid, 50c. Empire Cleaning Works, Middletown, Conn.

$30 WEEKLY mailing music evenings. Send 10cts for proof and copy latest popular sheet music. Royal Music Co., Albany, N. Y.

MAIL order business, large profits, to settle estate, $25. Realty, 39 Rutland Square, Boston, Mass.

I WON success with perfume business; started with $5.00, you can do likewise. All letters I now use with complete instructions, mailed for $1. Get started! Wesling, 506 East Utica St., Buffalo, N. Y.

SEND for my booklet "How you can become your own maer" without capital in a business in which there is no competition. E. Daugherty, 1236 W. Madison St., Chicago, Ill.

START Contracting. Make big money renovating and polishing automobiles, hotel, bank, bar, store, home furniture, etc. No experience needed, no competition, few dollars sufficient to start. Our polish formula is the best in existence. Full information for stamp. Seattle Specialty Co., 201 Empress Bldg., Seattle.

OPEN Automobile and Motorcycle business of your own. Capital and experience unnecessary. We show you how to get all the machines you can sell. Full instructions for $1. No stamps. John Routier, 221 Frost Ave., Rochester, N. Y.

GET the money. Have helped others and can help you. Particulars free. Stratton, 450 I. Hellman Bldg., Los Angeles, Cal.

DANCING Floor Wax; Start factory. Particulars green stamp. Chemisto, 1107 W. Augusta, Spokane, Wash.

YOUR classified ad can be placed in 1,000,000 small town homes at low cost every week. Ask for free Result Checking Book. Use letterhead. Classified Dept., Boyce's Weeklies, 500 Dearborn Ave., Chicago, Ill.

BIG Money in the Mail Order Business. Experience unnecessary. Small capital. Instructions free. Keith, 719 Central Bldg., Rochester, N. Y.

BE a chewing gum manufacturer at home, no machinery necessary, complete formula $1. Particulars for stamp. A. J St. Germain, 72 Canal St., Lewiston, Maine.

MAIL Order Dealers! Advertisers! You need our 1913 Advertising Rate Book with the latest Dollar-making feature "Ads That Pay." Hot from the presses! Gives you cost of Advertising in 2000 recognized magazines and newspapers, location, circulation, closing dates and other useful knowledge. Includes thirty original Mail Order propositions, winners every one of them. A $10,000 investment at your service. You can make a legitimate profit of 95c on every dollar order. This very valuable manual sent prepaid to you for 10c. Write now! Dearborn Advertising Agency, 521 Dearborn St. Chicago.

A Bit Shy on Salary? I pick up $1,500 yearly additional from newspaper correspondence. My book tells what's news, how to get it, where to sell. Newspaper directory included. No correspondence school expense; only 50 cents. Morris White, Station, 50, Detroit, Mich.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package costs you 1c. Machine, instructions complete $7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies. Desk C. R., Omaha, Neb.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

MANUFACTURE Gold Letters for signs—$100 per month easy. I start you. Experience unnecessary. Take like wildfire. Prospectus free. J. F. McPherson, 673 Brown Avenue, Butler, Pa.

COLLECT money by a sure, simple, system. Income $1,000 to $5,000 a year. Quick results. No capital required. Instructive book. "Skillful Collecting," free. National Collectors Ass'n., Long Street Newark, Ohio.

MAILING LISTS

FREE to business men, copy of our comprehensive "Silent Salesman." Contains over 2000 different classifications of Mailing lists with number and price of each list, and information every business man needs. Accept this free offer. Trade Circular Addressing Co., G 164½ W. Adams, Chicago.

NEW Mailing Lists. Also mail circulars. Satisfaction Guaranteed. W. V. Watts, Winona, Miss.

WANTED

FACTORY or Business Wanted—Will purchase active interest if suited. Give full particulars. No agents. Address Salesman, Box 1308, Cherry Valley, Ill.

WANTED—Mail order propositions, catalogues, samples, etc. Joseph Nyers, 816 S. Chapin St., South Bend, Ind.

WANTED—Women to use Complexo, the greatest beautifier of the age. Price fifty cents coin or stamps. W. J. Latham, Columbia, Tenn.

WILL pay cash for large observatory telescope. Eblen, 25 Whitehall Terrace, Atlanta.

WANTED—Information on making wire articles. Will pay cash. P. O. 47, Rainier, Wash.

WANTED—Aluminum transmission cover Ford 1910. Eli Melton, Butte, Montana.

WANTED to buy all kinds of old money and stamps. We pay highest cash premiums up to $1,000 on rare money to 1909. Send only 4c for our Large Illustrated Coin Circular. It may mean your fortune. The Numismatic Bank of Texas, Dept. H2, Fort Worth, Texas.

AGENTS WANTED

AGENTS Wanted—We want a live man in every town to act as a sales manager. We want you in your town. Devote your spare time to our business and you will make bigger money than you ever made before. Give us all your time and we will make you rich. These are facts, not promises. $50 a week at the start. Besides, a nobby free suit—and all the clothes you want at less than wholesale price. Wear one of our free suits as an advertisement and people will flock to you to buy a suit like it and you will coin money. Get our money making proposition and beautiful book of samples. Just send a postal card. We pay express charges on everything. Join the live wires—send us a postal today. Paragon Tailoring Co., Dept 314, Chicago.

WHEN tired of selling trash and gewgaws, write us and we will show you how our successful workers are building up permanent incomes. We are appointing Branch Managers everywhere and we furnish a plan whereby many earn $20.00 every day! Our new household necessity and our plan of handling it insures success to any man or woman willing to work. If you mean business, enclose 10c for 20c sample and get our plan. Gray's Sales Agency, Port Huron, Mich.

YOUNG man, would you accept and wear a fine tailor-made suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use $5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000, write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Copmany, Dept. 161, Chicago.

CONVEX portraits, frames and glass. Five to ten dollars a day selling our new line. Thirty days credit. Samples and particulars free. Our fourteenth year. The Culver Art & Frame Co., Westerville, Ohio.

WHERE did your money go? Find out. Begin any time with our Daily Expense Record. It will keep you posted and reduce expenses. A very interesting and complete book—50c. Agents wanted. Auburn Supply Co., Dept HH, 7746 Peoria St., Chicago.

WANT three swell made-to-measure shirts? Show our samples to friends, take a few orders easy and make enough profit to get yours free. New fancy patterns, made just as you want them. One good agent wanted in each town, spare time or all time. Write for beautiful samples, wholesale and retail prices and our liberal offer. Peerless Shirt Makers, Dept. 3, Chicago.

AGENTS make big money selling Sterling Vacuum sweepers (hand) with brush attachment. Also Magic electric. Exclusive territory given. Write quick. Give age, color, and experience for reply. Burns Sales Company, 1025 Walnut St., Philadelphia.

AGENTS—Lightning iron rust remover; a household necessity; record breaking sales. Sample and full particulars 10c. D. A. Brooks & Co., Box 223, Stroud, Okl.

BE Independent. Make $50 weekly with a New Invention, just patented, 8c profit on every dime. Small investment. Experience unnecessary. Circulars mailed free. International Metal & Ferrotype Company, Dept. B15, Chicago, Ill.

MAKE and sell your own goods. Formulas by Expert Chemists. We obtain your Government Serial Number. Catalogue for stamp. B. Mystic Company, Washington, D. C.

AGENTS: Earn $5 and $10 daily. Sell an entirely new line of Air Brush Design Show Cards, Price Tickets and other novelties. 350 varieties. Every Merchant buys. Catalogue Free. L. D. Thompson Co., 3159 La Salle St., Chicago.

AGENTS—$20 to $40 weekly selling Hosiery, Underwear, Sweaters. Samples free. Large line. Liberal commission. Sales-Manager, Room 62, 54 Worth St., New York.

AGENTS—To handle our new big seller; three to six sold in every home, big profits, exclusive territory. National Novelty Co., 301 Raynor Ave., Joliet, Ill.

AGENTS—Both sexes. Send for particulars of our up-to-date specialties. 100% profit. Sure repeaters. LeRoy Specialty Co., 76 Park Place, N. Y. Room 52.

AGENTS Wanted to sell our new specialty; needed in every home; can make $25 to $50 weekly; big seller. Address Morris Anderson, Box 24, Strum, Wis.

AGENTS Sell California Honey. Finest quality and flavor; freight prepaid anywhere on trial before paying. Three grades 10½c, 11½c, 12½c pound. Sample 10c, leaflet free. Good profits, steady orders. Spencer Apiaries Co., Box 199, Nordhoff, Cal.

AGENTS, Be quick—get the agency—never such a seller—make $100.00 a week—Model Vacuum Cleaner—carpet sweeper type—wonderful suction—your profit over 100 per cent—no competition—patented—we start you—the Cleaner sells itself—free sample to workers. Braham Co., D35, Cincinnati, O.

AGENTS. Here's Big Money for you. Something new. Improved Steam and Vacuum Clothes Washer. Beats any Wash Machine. Sells for $3.50. You make over 200% profit. Don't send any money, but write quick for Free literature and exclusive territory. Household Appliance Co., 4739 Evanston Ave., Chicago.

AGENTS make $5.00 to $10.00 a day on the start. Atkinson writes: "The best proposition I have found in my forty years canvassing." Permanent work. Household necessity. Saving 80%. Write to-day for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

$1,000 EARNED by three people within thirty days selling our Fire Extinguishers. Buyers everywhere, protected territory, 500% profit. Local and State Agents wanted. United Manufacturing Company, 1025 Jefferson, Toledo, Ohio.

WE are the largest manufacturers of Twisted Wire Brushes in America. Highest grade goods, best service, highest profit. Write for our new catalog. You are sure to win. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn. Western Branch, Wichita, Kansas.

AGENTS—$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

SAMPLE Free—Boyer's Automatic Re-Finisher for Furniture, Store, Bank and office Fixtures—Finest thing in the World. One application lasts a year. Applied with cheese cloth. Boyer Chemical Laboratory Co., State and Michigan Sts., Chicago.

SALESMEN—Men with successful sales experience who want a proposition that is high-grade and above the average, with opportunity to make big money right from the start, to handle subscription sale to business men only, special inducement offered and easy payments. Quick, easy sale, amount of sale $2.28, small first payment to apply on commission. Personal training and active co-operation in opening territory. Address W. A. Clink, 1705 Kesner Bldg., Chicago.

$10 TO $15 per day easily made, 150% profit, exclusive territory; our new cleaning, polishing, and dustless mop is the big money getter and record breaker. Duncan Bros., 2910 N. Troy St., Chicago.

AGENTS—Something new—fastest sellers and quickest repeater on earth. Permanent profitable business. Good for $50 to $75 a week. Write for particulars. American Products Co., 6125 Sycamore St., Cincinnati, Ohio.

AGENTS—$10 daily can be earned by everybody undertaking an easy agency as an extra; expert knowledge unnecessary. Write (preferably in German language) to A. Steenken, Amsterdam, Holland. (Postage 5c.)

SELLING Agents Wanted for "Fire Out." Best selling small fire extinguisher. A real money maker for you. Our proposition won't disappoint you. The Inst. Lighter Co., Dept. M., Columbus, O.

WRITES with water—The Helios Pocket Pen with compressed ink; beats fountain pens ten times its cost. Sample 25c. Big proposition to agents. William Muller, Security Bldg., San Francisco.

WE manufacture glass paper; plain glass windows made to look like real stained glass; something new; easily applied; big money maker; 2 sample sheets, catalogue in colors, with discount for 10c. Parrish Co., Lakeside Bldg., Chicago.

AGENTS—100% profit—sell to saloons—machine a whirlwind seller. Free sample and salesmanship course. Two sales a day $15 profit. Write. Simplex Mfg. Co., Dept. 7, Kewaunee, Ill.

MAIL Order Dealers should have our proposition. Imprint circulars furnished. Post Supply Company, Waltham, Mass.

MEN, women earn $3.00 to $4.00 per day introducing Art Mottoes. A genuine opportunity. Get our liberal terms. Gospel Trumpet Company, Dept E1, Anderson, Ind.

HOME Manufacturing—Pleasant and profitable business quickly established during spare time. Product international necessity. Write for particularls. Delzell Mfg. Company, Desk A, 448 South Mathews, Los Angeles, Cal.

CHANDELIER Clothes Dryer—Pulls up to ceiling on porch or in house. Clothes out of way. Holds good size washing or ironing; weighs three pounds; sent prepaid, $1.50. Every home will buy one. Agents wanted. Auburn Supply Co., Dept. DD, 7746 Peoria St., Chicago.

AGENTS—Earn $25 to $40 per week selling Nodarn Guaranteed Hosiery. Sales are simply doubled with our New Plan. 2 pr. guaranteed 2 mo., 3 pr. 3 mo., 4 pr. 4 mo., 6 pr. 6 mo. Spring Samples Free. Nodarn Hosiery Mills, Desk I, Dayton, O.

AGENTS make big money daily as our sole agent for "Little Wonder" Vacuum Cleaner. Fully guaranteed. With our plan agents make $10.00 to $15.00 daily. Beck Mfg. Co., 222 East 41st St., N. Y.

AGENTS make 500% profit selling our gold window letters, novelty signs and changeable signs. 800 varieties in enormous demand. Catalogue free. Sullivan Co., 1238 Van Buren St., Chicago, Ill.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 408 N. Clark St., Chicago.

AGENTS. A pair of silk hose Free to active Agents. State size. Agents wanted every town for complete and beautiful hosiery line. Large profits. Write today. Triplewear Hosiery Mills, Dept. D, 112 So. 13th St., Philadelphia, Pa.

MILK Tester "Inspector" shows immediately if milk is pure or how much water is added. Utmost practical article. Retails 50c; Big Profits. Specialties Co., 672 Eagle Ave., New York, N. Y.

REMNANT Store, 1331 E. Linn, Cincinnati. Greatest Dry Goods Bargains on Earth. Proposition to agents and storekeepers.

AGENTS get this Winner. Not another on market gets the money quick like this one. Repeat orders sure. Sells on sight. Big Profits. Free particulars. Write today. Leininger & Co., 808 Second Ave., Detroit, Mich.

$300 MONTH, five years, no canvassing, mail order or scheme. Absolutely new and exclusive. Box 4, Ft. Scott, Kan.

WRITE for new list of dandy articles for home manufacture. They're winners. P. Benson, Stewartville, Minn.

AGENTS—$10 per day sure selling our New 1913 Styles Silk Neckwear. 3 fifty-cent ties $1. Monogram Gold Cuff Link and Stick Pin Set given Free. Cooper made 75 sales in 7½ hrs. Profit $30. Free Samples to hustlers. Dayton Neckwear Mfg. Co., Dept I, Dayton, O.

SIGN Letters for store fronts, etc. Immense Profits. Sample Free. Flexible Letter Co., 25 Third Ave., N. Y.

IF you want to better yourself, send 2c in stamps for copy of Farmer Smith's Magazine, 10 Summit Ave., Cedar Grove, N. J.

AGENTS make good wages selling Kinley Scoop Flue Stop. Sample for 10c. Kinley Mfg. Co., Upper Sandusky, O.

SIDE Line salesmen and specialty men wanted. Japanese Novelty Co., Clinton, Ia.

HIGH Grade Salesmen and agents wanted. Excellent Proposition. Niagara Falls Novelty Co. Box 765, Niagara Falls, N. Y.

AGENTS make $30.00 weekly selling our 500 Handy Household Articles; catalogue free. Scheff Company, Desplaines, Ill.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

AGENTS make 200% selling Ropp's Calculator; most complete work of this kind ever produced. Improved edition just published; everyone needs it to save time and labor; greatest seller of the times; no previous experience necessary to sell it; sample, worth $1, mailed for 50c; particulars free. C. Ropp & Sons, 502 Lakeside Bldg., Chicago.

AGENTS wanted to sell sales books on good commissions in every city in the country. Write for samples and commissions. Chicago Sales Book Company, 158 N. Desplaines St., Chicago, Ill.

GENERAL Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business to sell the newest electric specialty on the market; sold everywhere there is electricity in the home, office, factory, store, hotel; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; shows how to use one light instead of two and get the same results; sells for $2.50, $3.50, $5.00 and saves the purchaser an investment of $25.00. Write for particulars. The Handy Light Co., 152 Handy Light Block, Cincinnati, O.

YOU can make more money operating a mail business, but before taking any chances invest 10c for two samples of "Booster"—the one bonafide Mail Order and Agents' publication on earth—a magazine that has for years actually and accurately started others like you in business for themselves by publishing the best money making propositions on earth—once that really get You the money! Send 10c today—it's worth dollars to you. Booster Magazine, Northwestern Building, Chicago.

$61.50 WEEKLY introducing and selling a new Gas Light Burner for Kerosene Lamps. Beautiful light. No chimney. No mantle. Perfectly safe. Simple in construction. Nothing to get broken or out of order. Will not burn out. Durable. Will last for years. Low price. Easy to sell, 200 per cent profit. Experience not necessary. Sample free. Why not try one on your lamp? Beware of imitations. No branch offices. Luther Manufacturing Co., Dept. 209, Cincinnati, Ohio.

EARN $15 to $25 a week or more as our Mail Order Dealer. Right from your own home. Hold your position until entire time is required. We are manufacturers and owners of Patented just-in-season specialties. If you are just starting a Mail Order business or if already established, you can't afford not to handle our Patented Money making getters. We sell exclusively to our Mail Order Dealers. We protect them. We carry stock and furnish everything. No canvassing. Small capital. Experience unnecessary. Write today for latest patented leader and manufacturer's easy selling Mail Order (copyrighted) plan backed up by "Whole Truth," positive proof and sworn statement. J. M. Pease Mfg. Co., 539 Pease Bldg., Main St., Buffalo, N. Y.

AGENTS wanted to sell a line of Custom Made Clothes at wholesale prices, selling price, $16.50 suit the same as other houses $25.00. Send us your name and address and let us convince you. No experience necessary, you can hold your present position and make good money with this. Highland Tailoring Co., Cincinnati, O.

OUR wonderful stove lid saves one-half of coal; hundreds in use; requires only ordinary mechanical ability to install; demand tremendous; the biggest seller of the year; 150 per cent profit for agents; write quick for full particulars, testimonials, etc. Pre-Heated Air Co., Room 627, 1011 Chestnut St., Philadelphia.

CASH for names, addresses, information, etc. Steady income at home. Instructive booklet for stamp. Information System, 290 Marietta, Ohio.

WONDERFUL portable bathing apparatus. Can bathe in any room. Only $6 with heater; $3 off price for short time to introduce them. Agents golden opportunity. Electric Bath Co., Findlay, O.

SALESMEN at $108 weekly salary. Help-a-phone and other specialties. Business men and others buy at sight. Complete set of instructions in salesmanship free. Harper Specialty Co., St. Marys, W. Va.

AGENTS—Made five days' test spare time, cleared thirty dollars; you can do same. Send for particulars today. Stewart Specialty Company, Chittenden Ave., Columbus, Ohio.

EXCELLENT opportunity for salesmen to sell our Magic Weeders and Hoes, the king of garden tools, to stores or house to house. Excellent exclusive or side line. Exclusive territory. Sample 35c prepaid. Reichard Mfg. Co., Bangor, Penna.

PHONE-MEGA has proven a wonderful seller. Every phone user wants one. Write for booklet, terms and offer of handsome sample case free. German silver sample sent for 24c. Exclusive territory. Be first! Lyon Sales Co., 631 Roe Bldg., St. Louis.

AGENTS. Cost 2c, sell 25c. Sign letters put on with roller. Samples free. Embossed Letter Co., 230 West Illinois St., Chicago.

AGENTS Wanted—Here's big money for you—and a stylish nobby suit absolutely free. $40 a week easy. Many are making more. Nothing to learn. Nothing to buy. Nothing to invest. No capital required. We furnish everything free—even the suit of stylish clothes you wear. Our men are the swell dressers and it don't cost them a cent, and they make big money every week. Get in now. Now is the time for the big money. Your name on a postal brings everything free. The handsomest lot of samples of the latest suitings you ever looked at to choose your suit from. And a book of fashion plates showing the very latest, nifty, nobby styles; also measuring blanks and everything needed—all free. We pay expressage on everything. Send that postal now—don't wait. This is your chance—grasp it. American Woolen Mills Co., Dept. 314, Chicago.

MAIL order men, general agents, sell "Nu-Pot" one of the greatest household necessities ever invented. Mends all leaks in all kitchen utens'ls; aluminum, granite, tin, copper and enameled ware, hot-water bags, etc., as if by magic, and so simple a child can do it. Best seller under the sun. Goods supplied to dealers under your own name with pulling circulars that produce the orders. Send 10c now for 25c package and full particulars. E. DeVore Mfg. Co., Columbus, Ohio.

SIGN Agents—Painters—Something new and better. Attracto ready-made Gold and Silver letters. 21 kinds, easily applied. Make big money lettering store windows, making signs, and selling our line of flashing, sparkling chipped glass name-plates. No experience needed. Write for sample letter and catalogue and start at once. Address Attracto Sign Co., 2655 North Clark Street, Chicago, or 519 Pacific Bldg., San Francisco.

UNHEARD of prices. Sales companies, crew managers, mail order houses, district agents. We manufacture several types of hand vacuum cleaners. All sweeper type. Easily operated, substantial, beautifully finished and guaranteed. Priced down to bed rock. If you can't visit our factory write for particulars immediately. You have never been in the cleaner business right before. National Vacuum Sweeper Company, 2004-10 West Lake street, Chicago.

SOAP agents make more money selling the celebrated Linro line. Coffee, flavorings, spices, soaps, perfumes, and 135 other items. Big commissions to you. Exclusive territory. Freight allowed. Handsome premiums to your customers. Free sample case. No deposit required. Free catalog. Linro Company, 13 Linro Bldg., St. Louis, Mo.

AGENTS, drop dead ones. Awake! Grab this new invention. Low priced water-power home massage machine. Magical, marvelous, mysterious. New field. Big profits. Sold on moneyback guarantee. "Margwarth sold 5 in 10 minutes; 31 in 2 days." "Parker sells 9 first day." Vaughn, "Your machine has merit. Express 6 dozen." Free information. Blackstone Co., 655 Meredith, Toledo, Ohio.

AGENTS can sell Sun-Ray Incandescent Kerosene Mantle Burners to everybody using lamps. Will sell on sight. New 1912 model 100 candlepower. Fits all lamps. Ten times brighter than gas. Write for catalog. Free particulars. Simplex Gaslight Co., Dept. M, New York.

AGENTS—Our New Steel Mantle Burners fastest sellers on market; fit all lamps; convert kerosene into gas. Smokeless, odorless. Guaranteed perfect white light. Sample burner postpaid, 25c. Lyndhurst Burner Co., Dept. P, Lyndhurst, N. J.

AGENTS—Men and women, newest invention. Wing Self Heating Gasoline Flat Iron; guaranteed, sells everywhere. Women delighted. Write for particulars. Wing Mfg. Co., 1608 Fulton St., Chicago.

AGENTS—Sell our high-grade line of perfumes, toilet articles, soaps and combination boxes. 150% profit. We are manufacturers. Hopfinger & Roth, 216 N. 2nd. St., St. Louis, Mo.

HAVE you a few hours to spare? We want man or woman in each town. No capital needed. An hour's work shows dollars earned in spare time. Pocket samples. 400% profit. G. C. Mfg. Co. (Dept. 104), 20 Warren St., N. Y.

WE furnish you capital to run profitable business of your own. Become our local representative and sell high grade custom made shirts, also guaranteed sweaters, underwear, hosiery and neckties, direct to homes. Write, Steadfast Mills, Dept. 10, Cohoes, N. Y.

AGENTS sell rich looking imported 36x68 rugs $1 each. Carter, Tenn., sold 115 in four days, his profit $57. You can do as well. Write for sample offer and selling plan. Sample rug by Parcel Post prepaid 98c. A. Condon, Importer, Stonington, Maine.

AGENTS—Our great luminous picture, Rock of Ages, wonderful, mysterious; cross shines brilliantly in darkest room; sample 50c prepaid; exclusive territory; big profits. Pioneer Portrait Co., 1242 W. 63rd St., Chicago.

AGENTS—A cent sent Swank tells about free offer and how to sell greatest discovery of the age in homes, stores, factories, offices. Easiest seller; out Nov. 29, 1912. Biggest profits. A. H. Swank Mfg. Co., Fremont, O., Dept. 19.

AGENTS and salesmen will secure free, complete information of numerous money making selling propositions and newest specialties in hands of responsible concerns by addressing Distributor, R-13-26 Cedar St., N. Y.

AGENTS sell Pals changeable scarf pin, make $30 weekly; send stamp for free sample. Pals Manufacturing Company, 25 East 14th Street, N. Y. City.

AGENTS wanted; sell our well advertised household article. N. J. Zehren, 617 Market street, Kenosha, Wis. Send stamp.

AGENTS to take orders for visiting and business cards; outfit free. Forman Printery, Waterbury, Conn.

GREAT, new agents article! Family knife and fork-cleaner, made of cork, felt and steel. Sells like wildfire. One dozen postpaid 70c. Sample 10c. Baur, 135 East 34th, New York.

FINEST made, guaranteed non-tarnishable gold and silver window letters, 2 inch 70c; 3 inch 80c; 4½ inch 90c per 100. Sample free. H. Alexander, manufacturer, 328 East 59th St., New York. Established 1905.

PARCELS Post Scales sell in every office. Men first in field making big money. Investigate. Booth, 12 Arcade, Utica, N. Y.

SELLERS—Sell our goods and get rich. Address, Wards Wholesale House, Rulo, Nebr.

REPRESENTATIVE wanted in every city and town to handle best paying business known—new—exclusive control. No canvassing—requires only small capital. Address Drawer 165, New Haven, Conn.

LIVE agents everywhere; big proposition; big profits; write at once. Ledger Printing Co., Box B, Ladora, Iowa.

AGENTS—Would you take a steady job where you can clear $20 to $30 weekly and work up to yearly profits of $3,000 or more. My line is snappy household goods. Quick sellers. Get busy with postal asking particulars. E. M. Davis, B17 Davis Blk., Chicago.

HAVE you seen the National Vacuum Sweeper Company's advertisement?

AGENTS—We have a proposition worth $40 to $60 a week to you with no competition. Bowman Company, Box 309, Waterloo, Iowa.

MIRROR in your hat with your name on. Latest craze. Selling fast. Sample 10c. T. Sullivan, 100 Abbott Ave., Fitchburg, Mass.

READ the Agents Magazine. Make more money. 2 months 10c. Agents Magazine, Chicago.

ORDINARY ability, plus our Sales-Driving Specialties. Makes good. Emporium Company, Minneapolis, Minn.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for $3.50 and saves the purchaser an investment of $25; write for particulars. The Handy Light Co., 14 Handy Light Block, Cincinnati, O.

LIVE Agents. Have automobile necessity. Everyone buys. Wirthman Laboratories, 16th and Grand, Kansas City, Mo.

OPERATE Hahn's Premium Machines, the best seller for cigars and candies. J. Hahn, 1016 Germantown Ave., Philadelphia, Pa.

HAVE you started to sell National Cleaners yet? Why not? See advertisement.

AGENTS—New automobile specialty. No extra tire needed. Nets $1.25 on every sale. Particulars free. Up To Date Novelty Co., Box 801, Chicago, Ill.

BIG Seller. Side line or agents. Johnston, Newport, R. I.

AGENTS wanted to sell household specialties; makes sales to every housewife. A. Griesser Specialty Mfg. Co., 628 North 43rd St., Philadelphia, Pa.

BIG Money. Repeat orders. Permanently profitable business. Labor saving devices needed in every home. Send for catalog and sample free. Ideal Housewives Specialty Company, Summit, N. J.

AGENTS—Be a live one with the goods that sell quickly. You can easily earn big money weekly. Novelty Co., Abingdon, Ill.

WANTED immediately agents to sell our high grade rebuilt typewriters, also ribbons and carbons; over 100% profit. Send for large illustrated catalogue and special agents offer. Harlem Typewriter Exchange, Agency Dept. 215 West 125th St., New York City.

ONE Million Agents Wanted. Fast sellers costing 2c, selling 25c, in quantities to $50. Every firm needs. Postal brings samples. Embossed Co., 240 West Illinois St., Chicago.

SALESMEN, get our dazzling "Book of Gold" Men's Free Tailoring Outfit. Classiest ever attempted—the absolute limit of sartorial supremacy. Success sure. Our men coining money daily—hourly: "Book of Gold"—your gorgeous free suit—$5,000 cash satisfaction bond—smash competition. Get our wonderful Big Free Offer Quick! Postal brings everything for comparison; then see how measly others are. Great Central Tailoring Co., Dept. 320, Jackson Blvd., Chicago.

GET Valuable Agency exclusively, in your locality, big weekly commission easily made by reliable, energetic men and women selling low-priced Ind-Electric Beauty and Health machine. Write immediately or lose big opportunity. Ind-Electric Mfg. Co., Desk 14, 432 Peoples Gas Building, Chicago.

SELL and install our No-Battery Electric Bells at big profit. $5 to $10 a day. Expert knowledge not necessary. We can help you start a big profitable business. Write for terms. Searles Electric Co., 1154C Monadnock Block, Chicago.

"I'LL Take a Box." Agents, sell a staple necessity and hear this every few minutes. Big money. Particulars free. Write a postal now, and mail to C. S. Mason, Westboro, Mass.

PORTRAIT agents find our plan beats all others. Prompt shipments—rejects credited. 30 days' Credit. Catalogue of Portraits, Frames, Pillow Tops, Sheet Pictures and samples free. James C. Bailey & Co., Desk W-5, Chicago

$15.00 DAILY paid hustlers and crew managers; $5.00 daily paid workers. One person wanted in each locality as agent for complete line Oil Mops, Self-Wringing Mops (5 styles) Fibre Brooms. Hilker Mop Co., 1211 Grand Ave., Chicago.

SELL dealers, make 50 per cent on sales; good article, attractively displayed. Retails 10c; send 5c for sample. Rawlings, Box 1053, Central Station, St. Louis, Mo.

EARN $7 to $12 daily, restoring faded colors in rugs and carpets, whole or spare-time. Original Armenian Process. Great demand. No capital. Full particulars free. Eldred, Dept. 75, Detroit, Mich.

SALESMEN wanted, no experience required; new, snappy proposition. Good for office and home. Good commission. Write us. R. H. Randolph Co., Dept. 54, Berlin, Pa.

AGENTS wanted for Japanese, Chinese, Mexican novelties and art goods. Quick sellers—repeaters—big profits. Particulars free. Stratton, 450 I. Hellman Bld., Los Angeles, Cal.

AGENTS, Dealers, Attention—Sell our Globus Calendar Pencil, wonderful new Mexican invention; changes date daily; instantaneous seller. Sample 15c. Bassett Specialty Co., San Antonio, Texas.

LIVE Agents make $10 a day. Silk 4-in-hand ties guaranteed three months—three for $1. Eight colors. Dollar secures Agent's Outfit. American Sales Agency, 1528 Masonic Temple, Chicago.

SIGN Agents, Painters, 500% profit with our splendid line guaranteed non-tarnishable gold sign letters, trade emblems make-up-yourself aluminum door plates. Catalogue, samples free. Eastern Specialty Co., Dept. 5, 63 Barclay St., N. Y.

"CREASE-EM" keeps trousers pressed two months. No trouble to apply. Will not injure the cloth. Liberal size package, 10c. "Crease-Em" Co., Chicago. Agents wanted.

BIG money in Essex Fan Motors, run by gas or gasoline. Winfield H. Smith, 10 Lock Street, Buffalo, N. Y.

SHOW Card Agents are rolling up the good old coin in bunches. Catalogue free. Popular Show Card Co., Dept. MR. 1235 Michigan Ave., Chicago.

AGENTS—200% profit, Household Necessities Samples, 25c. Howard Meschutt, Good Ground, N. Y.

"AGENTS Wanted" advertisers are most successful and enthusiastic users of advertising space in Boyce's Weeklies. The 1,000,000 circulation pays big. Write for free Result Checking Book. Use letterhead. 500 Dearborn Ave., Chicago, Ill.

KEY Checks—$1.45 per 100. Dies for stamping names on checks, fobs, umbrella plates. Wholesale prices—Collar clips, sewing awls, etc. We show you how to make $5 per day. Pease Die Works, Dept. M., Winchester, N. H.

F. E. FUCHS, 38 Park Row, New York, wants agents who can sell a staple article. Both sexes.

MAKE $21 next Saturday. Sell startling new invention—just out. Combination Burner and Filler for all Coal Oil Lamps. Unbreakable steel mantle. Big white powerful light. No smoke or smell. Fills Lamps quick. No dirty hands— no slopping oil. Low in price—selling like wildfire. Agents coining money. Johnson, Fla., cleared $40 first week. Hess, Iowa, made $7 one day. Exclusive territory and protection free. Not sold in stores. Send no money but write quick for details. Fairchild Co., 512 Nasby Bldg., Toledo, Ohio.

AGENTS on salary or commission. The greatest agents' seller ever produced; every user of pen and ink buys it on sight; 200 to 500 per cent profit; one agent's sales amounted to $620 in six days; another $32 in two hours. Monroe Mfg. Co. X. 6, La Crosse, Wis.

AGENTS—My Twelve "Money-makers" bring repeat orders. Easy selling plans. Big profits. A. Rolfe, 923 N. Alder, Philadelphia, Pa.

AGENTS—Start now, just in season, big profits, easy sales. H. Yale cleared $2,100 last year, McFadden $1,800 selling Photo handle knives and razors. Write United Cutlery Co., E. Fourth, Canton, Ohio.

$50 A MONTH earned at your own home! No canvassing or collecting required. All our work may be done in any room of the house in spare time without interfering with your regular duties and without your nearest neighbor knowing you work for us. New system of business and the greatest offer ever made. Write now before it is too late! Blye & Co., Dept. 31, Terre Haute, Indiana.

BEST Yet. $6 Profit on Each Sale. One lady agent took 5 orders first morning without experience. Rev. Waterman of Iowa sold 39 in 5 days. Any one can do it. Best and easiest operated Double-suction cleaner made, guaranteed 5 years. Warner Vacuum Cleaner Co., Box "Z," Muncie, Indiana.

SELLING our exclusive linen heel and toe guaranteed hosiery direct from mill to wearer. Pays big profits. Customers waiting. Re-orders insure permanent, increasing income. Exclusive territory. Credit. N. Parker Mills, 720 Chestnut St., Phila., Pa.

SALESPEOPLE everywhere will wish to find out why agents of the "Ever Ready" Specialties are doing better than others. A postal will bring all particulars. A. Lowell Mfg. Co., 108 Fulton St., New York City.

WE Pay $80 A Month Salary and furnish rig and all expenses to introduce our guaranteed poultry and stock powders. Address Bigler Company, X368, Springfield, Illinois.

SIGN Painting Agents. 1000% profit. Best and cheapest window letters made. Mounted sample free. Success positively guaranteed. Embossed Letter Co., 245 West Illinois St., Chicago.

AGENTS—County and State; men and women everywhere to sell the Pinless Clothes Line; a practical labor saving invention, lasts life-time, sells on sight, gives perfect satisfaction. Agent Sutton of Georgia, sold over million feet; 100% profit; write quick for exclusive territory; information free; sample prepaid 25c stamps. Pinless Clothes Line Company, 520 Wilcox Bldg., Portland, Oregon.

AGENTS. One cent invested in a postal card will bring you a $35.00 to $60.00 a week proposition. Sterling Aluminum Co., Canal Station, Chicago, Ill.

AGENTS—$50 weekly; we manufacture the best needle case made, a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over $100 weekly; send 10c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. Paty Needle Co., 102 Union Sq., Somerville, Mass.

BEAUTIFUL Embossed Gold Window Letters make 1000% profit without experience. New easy proposition. Signs always needed. Ours last for years. Rock bottom prices. Essentials to work with mailed free. Embossed Letter Co., 235 W. Illinois St., Chicago.

SHAVEZY Guard makes Safety Razor of your own favorite blade. Excellent line for shopmen everywhere. Sample 25c. Particulars, red stamp. Keon Mfg. Co., Waltham, Mass.

BOKARA Diamonds—Agents, everyone, to wear and sell our famous Bokara Diamonds. Write for sample offer and catalogue Free. Northwestern Jewelry Co., 52 Northwestern Bldg., Chicago.

YOU can make big money writing letters for us during spare time. We furnish everything. International Mercantile Alliance, 125 Bloomfield Street, Hoboken, N. J.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 406 N. Clark St., Chicago.

AGENTS Wanted—Mechanics and shopmen make over $100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. Novelty Cutlery Co., 67 Bar St., Canton, O.

YOU can make $$$$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, 113 Redd St., Newark, N. Y.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voorhies, Desk C. R., Omaha, Neb.

AGENTS—Handkerchiefs, dress goods. Carleton made $8 one afternoon; Mrs. Bosworth, $25 in two days. Free samples. Credit. Stamp brings particulars. Freeport Mfg. Company, 59 Main St., Brooklyn, N. Y.

AGENTS—Portraits 35c. Frames 15c. Sheet Pictures 1c. Stereoscopes 25c. Views 1c. 30 days' credit. Samples and catalog free. Consolidated Portrait Co., Dept. 1196, 1027 W. Adams St., Chicago.

PORTRAIT Agents—Send for free catalog Portraits, Frames, Medallions, Pillow Tops, Sheet Pictures, etc. Prices, quality considered, lowest of any. Pioneer Portrait Co., 1265 W. 63d St., Chicago.

AGENTS—Our Columbia Folding Hand Bag is the best proposition on the market. Not sold in stores. Big profit. Write for terms and other big sellers. S. V. Diamond, 35 West 21st St., N. Y. C.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

AGENTS—Ask us about our snappy household specialty line which will clear you $50 to $80 weekly. American Aluminum Co., Div. 7, Lemont, Ill.

DON'T fail to read Independence and Fortune under Business Opportunities.

AGENTS—Ladies or gentlemen, to sell the highest grade toilet goods, flavoring, etc., direct to families. High class house; fair dealing; repeat orders sure; large cash commissions. Address Kingham Bros., Indianapolis, Ind.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R. Cincinnati, Ohio.

AGENTS wanted for Oriental novelties, never before seen in America. Quick sellers. Repeaters. Immense profits. Shaw Kanematz, Box 529, Portland, Oregon.

1500% PROFIT selling our Gold Sign Letters. We'll show you how. Sample free. Johnston Co., Quincy, Ill.

HELP WANTED

SALESMEN—You can do a wonderful business with the Jewel Vacuum Sweeper (3 sizes). It is the perfect non-electric household cleaner. Sightly, attractive, light, strong and absolutely efficient. Our salesmen are "cashing in" on its merit. We give you merchants' standing—with credit to do big business and advertise the Jewel in your local newspapers over your own name. A big offer for able men or women. Exclusive territory. Address General Appliance Factory, 1372 Main Street, Marinette, Wis.

MEN and Women Wanted for Government Positions. $90.00 month. Annual vacations. Short hours. Parcels Post means thousands of Railway Mail Clerks needed. "Pull" unnecessary. Farmers eligible. Write immediately for free list of positions open. Franklin Institute, Dep't L 21, Rochester, N. Y.

YOUNG Man, would you accept and wear a fine tailormade suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use $5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000 write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 162, Chicago.

SONG poems wanted. New plan. Big money. Past experience unnecessary. Send poems or melodies. Free book and advice. Hayworth Music Co., 660 G, Washington, D. C.

SHOPMEN, mechanics, anyone, increase your income making and selling canvas gloves. Anyone can make them at home, on any sewing machine with our patterns, samples and instructions which we send prepaid for one dollar. P. C. G. & Mfg. Co., 525 Timken, San Diego, Calif.

WRITE Moving Picture Plays; $10 to $100 each; all or spare time; experience or correspondence course unnecessary. Details free. Atlas Publishing Co., 3045 Cincinnati, O.

500 MEN 20 to 40 years old wanted at once in every state for Electric Railway Motormen and Conductors; $60 to $100 a month; no experience necessary; fine opportunity; no strike; write immediately for application blank. Address Manager, W-256 Dwight Bldg., Kansas City, Mo.

MEN and Women Wanted for Government Parcels Post Positions. $90.00 month. Write for vacancy list. Franklin Institute, Dep't L 21, Rochester, N. Y.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

WE want young man or woman, about eighteen, in each town, to give spare time to good paying work. The Strathmore Press, 545 B Mass. Ave., Cambridge, Mass.

SONG Poems Wanted. New Plan. Big money. Free book tells all. Hayworth Music Co., 660 G, Washington, D. C.

GOVERNMENT Wants Railway Mail Clerks for Parcels Post. Thousands needed. $75.00 month to commence. Examinations everywhere May 3rd. Sample questions free. Franklin Institute, Dep't L 21, Rochester, N. Y.

WANTED—Hustling man, every town and country community, who wants to get ahead, learn, and earn more. Fine chance. Write quick for full particulars. Box B4-293, Covington, Ky.

THOUSANDS of Railway Mail Clerks wanted by U. S. Government for Parcels Post. $100 Month. Examinations everywhere May 3rd. Sample questions and list of positions open—free. Franklin Institute, Dep't L 21, Rochester, N. Y.

SONG poems wanted—Send us your song poems or melodies. They may become big hits and bring thousands of dollars. Past experience unnecessary. Available work accepted for publication. Instructive booklet and information free. Marks-Goldsmith Co., Dept. 18, Washington, D. C.

WANTED: First Class Electrical Instrument Makers for our Experimental Department. Address, Employment Department, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

DON'T Pay Anything to Learn a Trade. Investigate our system of teaching on actual contract jobs. Plumbing, bricklaying, electricity, automobiles; 200 workmen; six years' experience. Catalog free. United Trade School Contracting Co., Los Angeles.

BE a Detective—Earn $150-$300 monthly. Greatest opportunities. Write Frederick Wagner, 1243 Lexington Avenue, N. Y.

WANTED—Automatic Screw Machine Operators, Hand Screw Machine Operators, and Electrical Instrument Makers. Apply at the Employment Department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

RAILWAY Mail Clerk Examinations everywhere May 3rd. Parcels Post requires thousands. Coaching free. Franklin Institute, Dep't L 21, Rochester, N. Y.

GET prepared for Railway Mail, Parcel Post, Letter-Carrier, and other government positions; write for free booklet. Allen's Civil Srvice School, Dept. K, Rochester, N. Y.

ENTER the Merchant Tailoring Business for yourself. Learn to cut men's clothes by our easy system. Big profits—no investment. Full particulars free. Write today. Success School of Cutting, Dept. 11, Jackson, Mich.

CIVIL Service Examination—I prepare you for any branch of Mail Service. Pay me after appointment. Write for free entrance test. Dan Tuhey (Retired R. R. Clerk), 12 Tuhey Bldg., Denver, Colo.

BIG Profits—Open a dyeing and cleaning establishment, little capital needed. We teach by mail. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, N. C.

BIG Money Writing Songs—We pay hundreds of dollars a year to successful writers. Experience unnecessary. Song poems wanted with or without music—will pay one-half of profits if successful. Send us your work today. Acceptance guaranteed if available. Largest concern in the country. Free particulars. Dugdale Co., Dept. 265, Washington, D. C.

PARCELS Post Jobs open. Write for list. Franklin Institute, Dep't L 21, Rochester, N. Y.

TRAVELING salesmen wanted to carry side line—fans and advertising novelties. Big commission promptly paid. Exclusive territory. Samples free. The Standard Art Company, Dept. 2, 29 So. Clinton St., Chicago.

WANTED—Railway Mail Clerks, $75.00 month. Examinations everywhere. Coaching free. Franklin Institute, Dep't L 21, Rochester, N. Y.

WANTED—Distributors, men or women, to give away free packages our famous Perfumed Borax Soap Powder; no money or experience needed; good pay. Ward & Co., 1775 Berteau Ave., Chicago.

DRAW Big Salary Drawing Cartoons. Demand for cartoonists way ahead of supply. We teach rapidly and thoroughly in your home by proven methods. Low cost, easy terms, big return. Particulars for stamp. Hamilton School, 209 E. Ontario St., Chicago, Illinois.

WANTED, Machinists, Agents, double your salary! Saunders' Hand Book Practical Mechanics; lightning reference. Thousands used. $1.00, $1.25, $1.50. Circular sent. E. H. Saunders, 216 Purchase St., Boston, Mass.

GET prepared for May 3rd Railway Mail Clerk and other Government examinations by former United States Civil Service Secretary-Examiner. No "free preparation" or "positions guaranteed" schemes. Straight proposition. "Real Courses." Arthur R. Patterson, Municipal Square, Rochester, N. Y.

DETECTIVES earn from $100 to $500 per month. How much are you earning? Write for particulars. Interstate Detective School, Peoria, Ill., Suite 11, McDougal Bldg.

CASH for information, names, formulas, and ideas. Steady, profitable home business. Instructive booklet for stamp. Information System, 291, Marietta, Ohio.

SALESMEN—Two for each state, salary and commission. Signet Oil Co., Cleveland, O.

MEN to distribute samples. Royal Syrup Co., Albany, N. Y.

BE a Detective. Earn $200 monthly, positions open. A practical course in Detective Work taught by mail. American School of Criminology, Detroit, Michigan. Dept. F.

WANTED—Distributors of advertising matter everywhere. American Distributor, Blairsville, Pa.

BE A detective—Earn $150 to $300 per month; travel over world. Stamp for particulars. National Detective Agency, Dept. P 26, Chicago.

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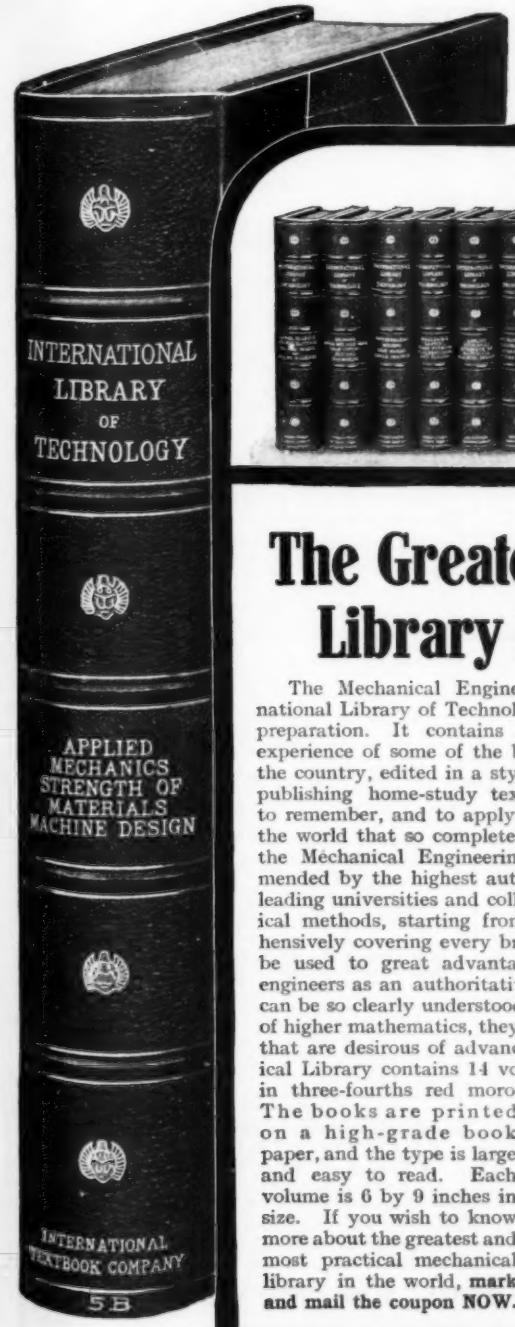

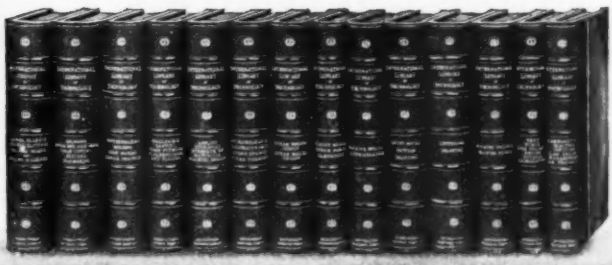

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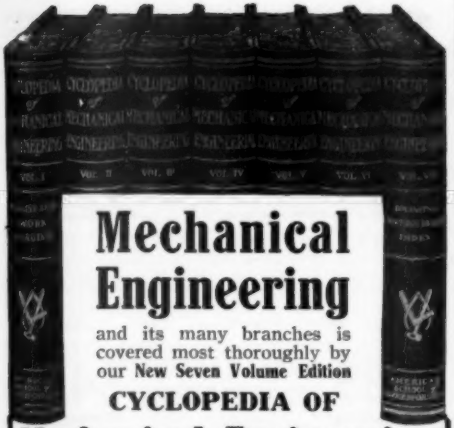

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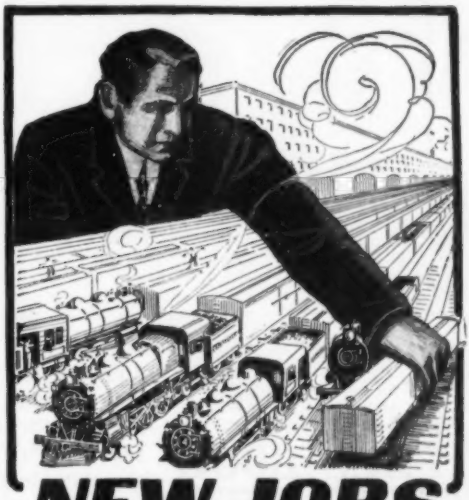

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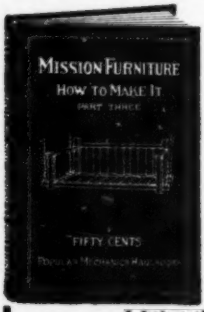

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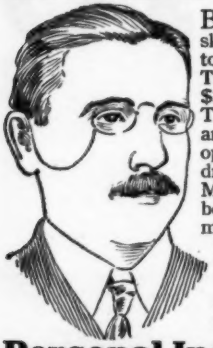

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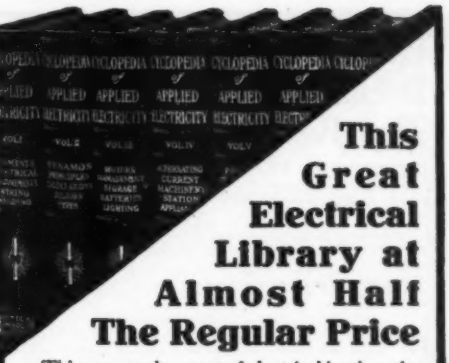

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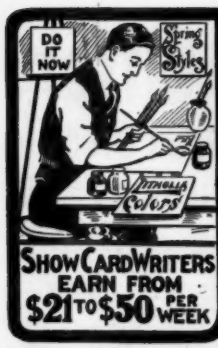

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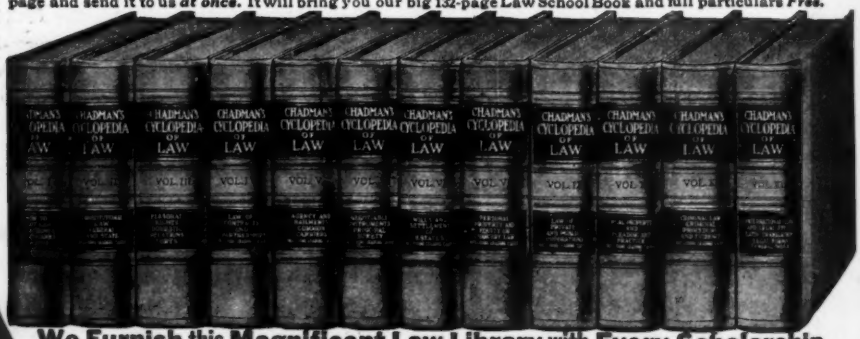

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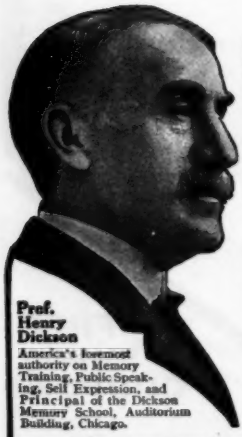

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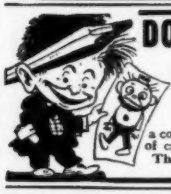

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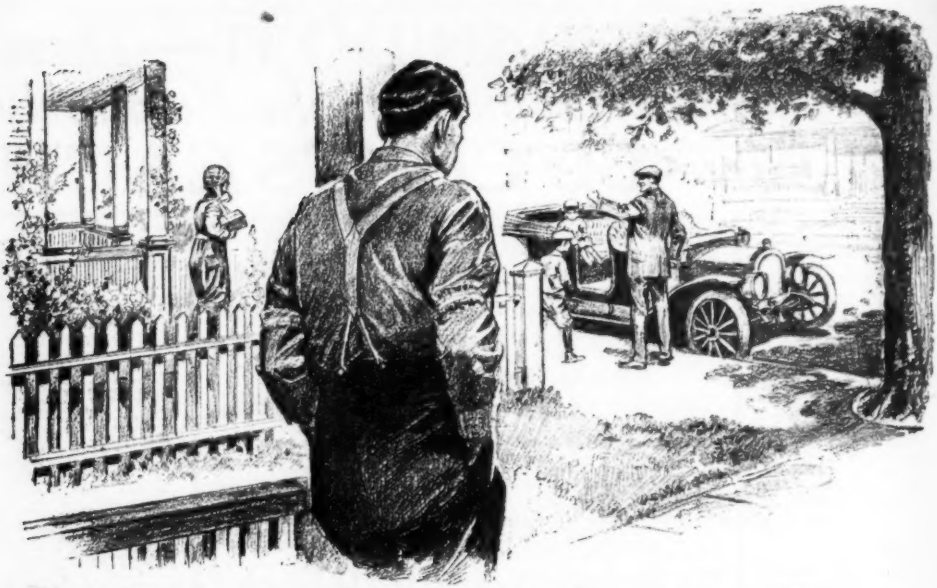

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No use envying the man who has made good. Don't think he got where he is because he had a "pull." A "pull" doesn't amount to much unless you can deliver the goods, and the best "pull" in the world is **training.**

Just make up your mind today—**right now**—that you are going to be a **trained** man—that you are going to get the money and hold a good job. **You can do it.** The **American School of Correspondence** will show you how. This great school, with its sixty-five complete courses in **Engineering, Business and Law,** can soon give you the training necessary to become a successful man—a man who will be envied as you, perhaps, now envy the men above you.

Your Opportunity Coupon

Check the course you want and mail the coupon now

American School of Correspondence, Chicago, U. S. A.
Please send me your Bulletin and advise me how I can qualify for the position marked "X." Pop. Mech. 3-13

....Electrical Engineering	....Lawyer
....Elec. Light & Power Supt.	....Bookkeeper
....Electrical Wireman	....Stenographer
....Telephone Expert	....Private Secretary
....Architect	....Accountant
....Building Contractor	....Cost Accountant
....Architectural Draftsman	....Cert'f'd Public Acc'nt
....Structural Engineer	....Auditor
....Concrete Engineer	....Business Manager
....Civil Engineer	....Fire Ins. Inspector
....Surveyor	....Fire Ins. Adjuster
....Mechanical Engineer	....Fire Ins. Expert
....Mechanical Draftsman	....Moving Picture Op'r
....Steam Engineer	....Sanitary Engineer
....Stationery Engineer	....Reclamation Eng'r
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The **American School of Correspondence** was established fifteen years ago for the benefit of ambitious men and women everywhere. This school makes it possible for you to obtain the education and training you need without leaving home or giving up your work. It will bring a practical college course to you right in your own home.

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Write the **American School** now, while the subject of making more money is on your mind. State how far you went in the public schools, what you are doing now, and what you would like to be. Your case will receive special attention.

The **American School** will tell you the best and quickest way to better your condition and get more money. Check the coupon and mail it now. Don't let this matter drag another day. Another year might slip by and find you at the same old job and prospects for a raise very slim.

American School of Correspondence
CHICAGO, U. S. A.

Popular Mechanics Magazine
WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 19 MARCH, 1913 No. 3

Plow Driven by Self-Contained Engine

A POWER-DRIVEN plow, behind which the operator walks, as with a horse-drawn plow, is a recent invention. The power plant consists of a two-cycle, 9-hp. gasoline engine mounted between the handles and geared to two spiked drive wheels. The downward pull of the plow cutting its way through the soil holds the drive wheels to the ground and the spikes prevent slipping. When the plow strikes a root, stump, or large rock, the spiked wheels slip and the machine can be thrown out of gear instantly. It is then easily raised above the obstruction by lifting on the handles, the engine is thrown into gear again, and the plowing proceeds.

The outfit may also be used for other purposes than plowing. A number of attachments are provided, including turning points for breaking land, a seeder for planting corn, cotton and

Motor-Driven Plow, Which may be Converted into a Cultivator, Mower or Seeder

other seed crops; disk harrows, weeders, listers, sweeps, and the like, for cultivating; a spraying attachment, including tank and pump, and a mower cutter bar and rake attachment. When not in use as a plow or cultivator, the engine may be used for driving stationary machinery.

ADVERTISING AUTOMOBILES IN THE AIR

A new method of advertising the strength and rigidity of automobiles is here shown. The vehicle, which contained three persons, was driven by its own power part way up the front steps of the new capitol at Boise, Idaho, and then lifted by a heavy derrick high into the air. The steps are 13 in. broad and 6 in. high, and a large crowd gathered to witness the performance.

Automobile Suspended above New Capitol at Boise, Idaho

¶A large underground river was recently pierced in driving a tunnel through the Côte d'Or Mountains in France and the workmen barely escaped with their lives.

HOSPITAL SCHOONER FOR FISHING FLEETS

A bill that provides for the construction or purchase of a schooner to be used as a marine hospital in connection with the fishing fleets of the North Atlantic Coast has been presented to the House Committee on Merchant Marine and Fisheries. The probable cost of the project will be $30,000 for the schooner and its equipment, with about $15,000 as the annual appropriation for maintaining the service.

FOOT PUMP FOR INFLATING TIRES

The foreign-built automobiles lack many of the conveniences which are considered essential in selling a car in this country. Among other accessories which are frequently not provided is the engine-driven air pump. A recent invention to render this work more easy is the powerful air pump shown in the illustration which is operated by foot power.

Foot Pump for Inflating Tires

NEW YORK FIRE HOUSE MOVED ON A BARGE

A 150-Ton Steel Fire House, with 65-Ft. Tower, Moved Down the Harlem River on a Barge

The two-story fire house occupied as living quarters by the men operating the fire boat "C. W. Lawrence," of the New York fire department, was recently floated down the Harlem River on a barge to a new site. The building is a steel-frame affair, 41 ft. long by 27 ft. wide, having a tower which rises to a height of 65 ft.

The crew of the fire boat used the house during the time it was being moved. An alarm was given and the fire boat called out while the structure was being placed upon the barge.

DELIVERING GROCERIES WITH A MOTORCYCLE

Motorcycles of the side-car type, equipped with a large parcel box, are being used in the larger cities for delivery purposes, but in this illustration is shown an ordinary pleasure motorcycle, provided with no package-carrying accessories whatever, used by a young man in Redlands, Cal., for delivering groceries. The load being carried when the picture was made consists of 16 lb. of potatoes, 1 lb. of coffee, 10 lb. of bacon, a can of lye, loaf of bread, head of cabbage, 4 lb. of apples, a package of corn flakes, 10 lb. of graham flour, 10 lb. of corn meal, 5 lb. of chipped beef, two boxes of biscuits, three cans of beans, a box of raisins, 2 qt. of cranberries, 16 lb. of sugar, a package of figs, 50 lb. of flour, and 5 gal. of gasoline.

Motorcyclist Loaded Down with Groceries

AIRMAN RENEWS GASOLINE SUPPLY AT SEA IN GALE

A remarkable demonstration of the efficiency of a hydro-aeroplane on the open ocean in bad weather was made by airman Glenn L. Martin, of Los Angeles, recently, with Frank A. Garbutt, a California yachtsman, as a passenger. They flew for 235 miles along a forbidding section of the California coast, and alighted safely in a heavy sea while searching for the lost airmen, Horace Kearny and Chester Lawrence, who were thought to be floating in a helpless air craft with which they had attempted a flight over water to San Francisco.

Martin alighted on the 15-ft. waves twice and took gasoline from the yacht "Skidbladnir," demonstrating that he could bring his plane down satisfactorily through what sailors term "half a gale" and maintain it at rest with safety while high waves were running. He showed that long stretches of beach and water might be patrolled by aeroplane when boats could not do successful service owing to the limited scope of vision from the water's surface. The result of the flight was a valuable contribution to military and naval aviation.

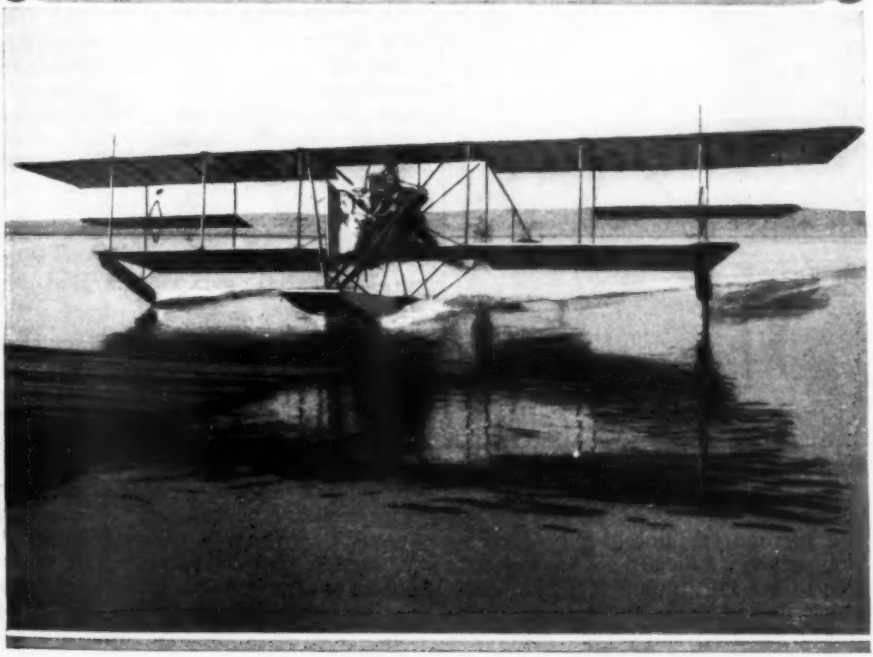
The airman's experience in flying on the open sea, at which he had been practicing for a year, stood him in good stead when it was found necessary to come down with a 30-mile wind above and a high sea running below. Instead of alighting against the waves Martin touched the water with the aeroplane running at right angles to the swell and just back of the crest of a wave, the planes acting as outriggers. The first wave after alighting struck the end float of the rear plane. This at once had the effect of bringing the aeroplane around into the wind, and the airman could keep his machine afloat. When he wished to get into the air again, Martin turned the aeroplane, after starting his motor, and ran along the trough of the sea, until he reached a degree of speed sufficient to raise the machine from the water. Martin declares that he is convinced that a seaworthy hydroplane may be handled successfully in a very heavy sea.

The transfer of gasoline from the yacht to the air craft was fraught with danger, for the waves were running so high that the men on the launch could see the biplane only when Martin climbed on the top plane and signaled to them. It was decided not to abandon the search for the missing men and after the first supply of gasoline was consumed the yacht put back to the harbor for more fuel. It was later discovered that when Garbutt suggested the flight, Kearny and his passenger had gone under water, and hence the attempt at rescue was bound to be fruitless, but as a demonstration of the practical uses of the hydro-aeroplane the flight yielded valuable results.

Within five hours the passenger, through powerful binoculars, was able to look into every field of kelp and the most rugged coast canyons, while the broad expanse of turbulent sea lay before his eyes like a relief map, in which he could see every foreign object. One hundred boats traveling abreast could not have covered the area to be searched so minutely. When the report came that Kearny and Lawrence —the latter drove the first transcontinental automobile from Los Angeles to New York—were missing, Garbutt, who has cruised through the waters of southern California in all kinds of weather, realized that a search by boats could scarcely bring results within the time necessary to save life

He therefore telephoned Martin, explaining that it would be necessary to scan a stretch of land and water about 50 miles in length by 30 miles wide, and suggested that this might be accomplished most practically by aeroplane. Martin responded and from the experience he gained in that flight declares that he will build a hydro-aeroplane which will remain afloat as long as the man can stand exposure. Frank Garbutt declares that as a means for

The Hydro-Aeroplane Starting Out from the Shore on the Water

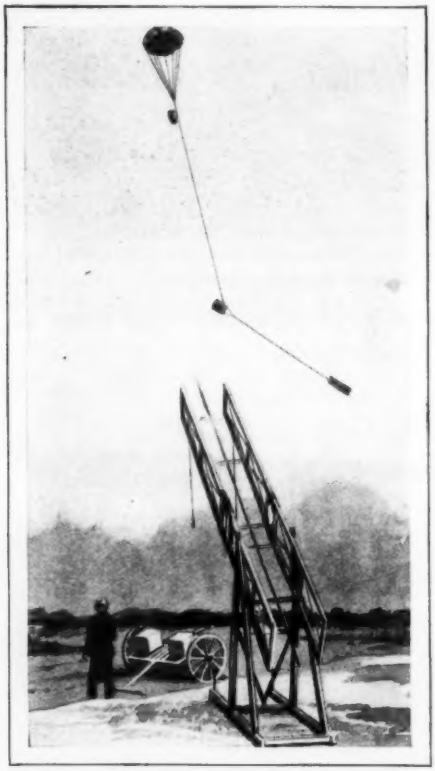


Airman Glenn L. Martin and Passenger in Hydro-Aeroplane

patrolling the coast he believes the hydro-aeroplane will become an important factor and that the most successful search and rescue results along the coast may be achieved by means of these craft.

ROCKET CAMERA TAKES PHOTOS FROM SKY

Taking pictures of towns, forts, and other scenes from the sky by means of a camera borne aloft by a large rocket



Rocket Camera Parachuting to Earth after Photograph has been Taken; Projecting Apparatus in Foreground

is a method of photography used by foreign army officials. The rocket is fired by setting in motion a gyroscope, which device holds the camera in its proper position until the rocket has reached a height of about 2,600 ft., when, just as the camera begins to fall, its shutter is released and the photograph is taken. At the same instant a parachute attached to the rocket camera is opened and the entire apparatus descends gently to the ground in about 15 minutes. The gyroscope automatically points the camera in the right direction when the photograph is taken and the complete apparatus is carried over the ground upon a two-wheeled carriage.

ICEBERGS ATTRACT WARM WATER

Icebergs produce a certain rise in temperature while melting in salt water, according to observations taken by a scientist of McGill's University, Canada. It is said that this peculiar result is caused by a cold current descending from the iceberg and carrying with it all the cold water from the iceberg, while a horizontal current near the surface of the water flows in toward the ice, thus causing it to melt. This is the reason, it is claimed, why the water in the immediate vicinity of icebergs often shows a perceptible increase rather than a decrease in temperature, and that the iceberg provides for its own destruction by thus drawing a warm current of water toward itself.

SMOKESTACK USED TO EXTINGUISH GAS WELL

A very unusual and ingenious method was devised to extinguish a burning gas well at Lone Pine, Pa. The well in question, which has a capacity of 5,000,000 cu. ft. per day, was ignited by a flash of lightning. After three days of ineffectual attempts to extinguish the gas, a boiler stack, with base, was mounted on rollers and moved over the 8-in. casing of the well. A sudden jerking away of the stack, out of the top of which the flame was raging, made a break in the current of gas, thus extinguishing the fire instantly.

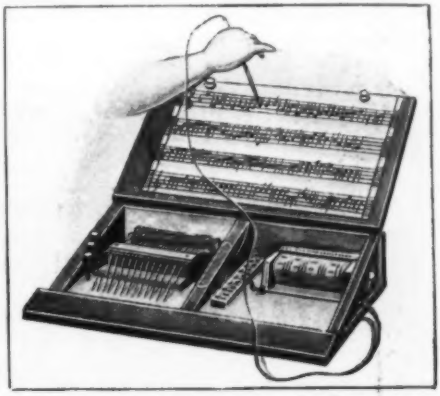
New Parcel-Post Motor Van

CITY TO HEAT ITS HOUSES WITH ELECTRICITY

The city of Seattle, through its municipal lighting department, has made provision for heating the homes of her citizens by installing electrical heating coils under hot-water boilers and individual radiators in the houses of those who order the service. The heaters are automatically controlled by a device which shuts off the current when the heat reaches the desired degree and turns it on again when the temperature falls below a certain degree. It is said that these heaters provide a satisfactory amount of heat at a less cost than coal.

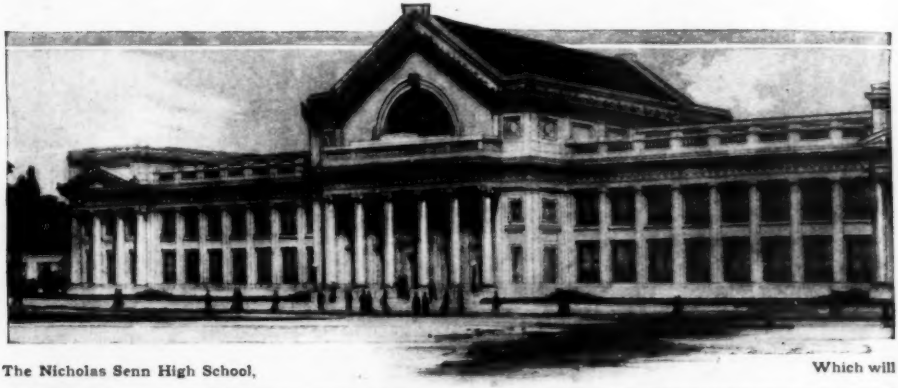
MUSIC PLAYED BY PUNCHING HOLES IN SHEET MUSIC

On the inside of the cover of this remarkably ingenious electric music box, designed to train the ear of the young student of music, are arranged four rows of electric wires, over which the sheet of music to be played is placed. By consecutively piercing the heads of the notes on the sheet with a metal-pointed pencil, electrical circuits are closed, which, by means of electromagnets, operate the hammers of the music box proper, thus producing the notes perforated. A special device is provided to set the apparatus to the key in which the music is to be played, and sharps, flats and naturals can be produced by operating push buttons.

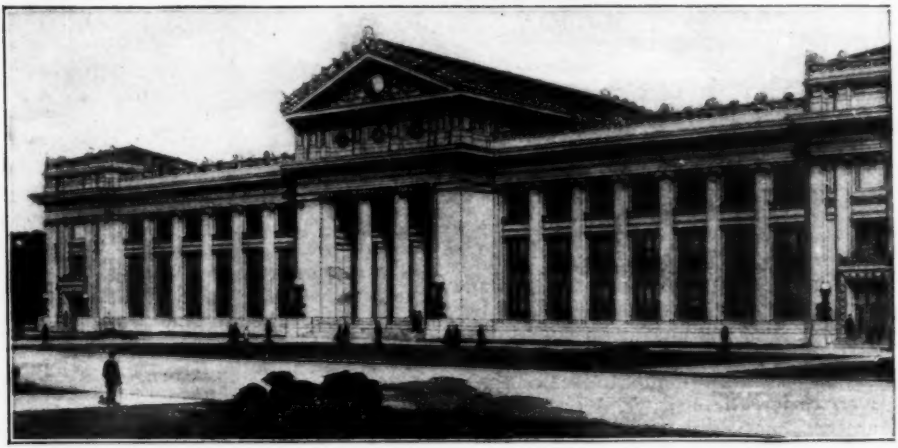


Punching the Heads of the Notes on the Sheet of Music Operates Electromagnets and Sounds the Notes in the Music Box

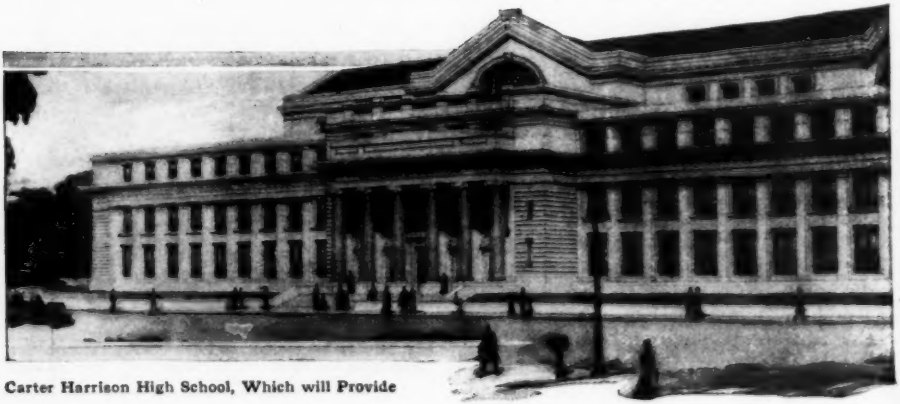
THREE NEW TECHNICAL HIGH SCHOOLS OF CHICAGO



The Nicholas Senn High School, Which will



Hyde Park High School, Which will Include

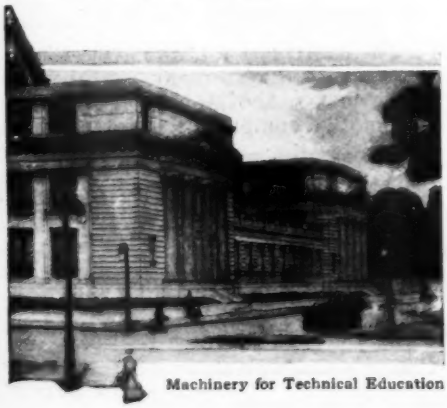


Carter Harrison High School, Which will Provide

DESIGNED ALONG ORIGINAL AND DISTINCTIVE LINES

Have a Complete Athletic Field

a Swimming Pool in Its Equipment



Machinery for Technical Education

The new Carter Harrison High School has been designed for the purpose of giving both boys and girls an advanced technical education. Provision has been made for teaching girls not only domestic sciences, but various trades which, heretofore, could only be acquired by boys. The new building has a seating capacity for 2,000 pupils; an assembly hall that will accommodate about the same number of persons, and a shop annex containing a large assortment of tools and machinery necessary for a liberal technical education. The estimated cost of the structure is $850,000 and the equipment will require an expenditure of $100,000.

The Hyde Park High School is designed to accommodate approximately 2,000 students and affords facilities for classical, scientific and technical courses. The building contains 50 recitation rooms, an assembly hall for seating 2,000 pupils, and a swimming pool, besides the other necessary departments. The appropriation for the new structure was $600,000 and $100,000 for the furniture and equipment.

The Nicholas Senn High School follows practically the general design and plan of the Hyde Park building. The same number of students will be accommodated and provision is made for a similar amount of cubic space, furniture and equipment. As the site upon which the school stands is so large, a complete athletic field will be provided for racing, baseball and football contests. Each of the new schools has a complete cafeteria for supplying lunches to pupils who come long distances and cannot return to their homes at noon for lunch.

¶The largest force of workmen employed on the Panama Canal and Panama Railroad at one time was during last November, when a total of 40,150 people were at work. Of this number about 5,500 were white Americans.

WOODEN BULLETS AIDED IN TURKISH DEFEAT

That the complete rout of the Turkish troops on the battlefield of Kumanovo may not have been altogether due to the bullets of the opposing forces; that, in fact, the bullets of the Turks themselves may be blamed to some extent for the defeat, has developed out of the finding of boxes of dummy ammunition—wooden bullets—on the field. By some mistake, a portion, at least, of the Turkish troops were issued wooden-bulleted cartridges. Such bullets are used for instruction purposes, to teach recruits how to load their rifles. These cartridges contain neither percussion caps nor explosive, and the wooden bullets are painted red.

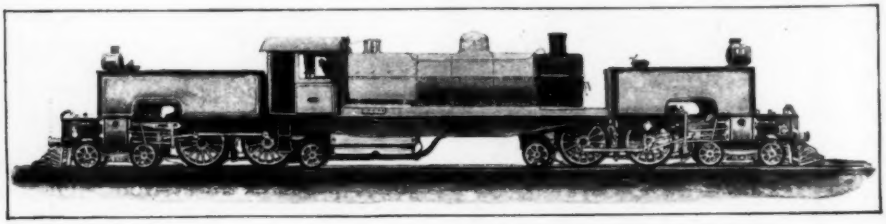
Wooden Bullets, Designed for Practice in Rifle Loading, Found on Battlefield after Defeat of the Turks

AN INGENIOUS SCHEME FOR FIRE-ALARM DRILLS

The worst feature of regular fire drills in schools is that they are "made to order:" that is, the teacher or janitor, or some one else in authority, gives the alarm. Under such a system of drills it is quite improbable that the children would immediately know in the event of an actual fire that the alarm was "real," and not simply a drill, so the superintendent of a school in West Roxbury, Mass., has devised a scheme to correct this. He painted a small piece of wood red, and instructed both teachers and pupils to immediately run and sound the automatic alarm whenever and wherever they happened to find it. He hides this piece of wood in various parts of the building, perhaps in a teacher's desk, in the coat room, or behind a door. Sooner or later, a pupil or teacher discovers it, the alarm is sounded, and the children pass out of the building not knowing whether it is a drill or a fire.

A THREE-PIECE LOCOMOTIVE

The construction of the newest locomotives for the Tasmanian railroads is somewhat out of the ordinary, each locomotive comprising three separable



The Novel Three-Piece Locomotive Designed for the Tasmanian Railways

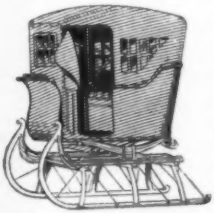
parts. The middle section, consisting of a frame, carrying the boiler, fire box and cab, has no wheels under its central portion, the two sets of drive wheels being arranged as shown, one forward and the other at the rear. Owing to the absence of drive wheels and other mechanism directly under the boiler, the fire box, which runs down very near the track, is exceptionally ample.

THREE-CENT AND HALF-CENT COINS FOR UNITED STATES

The coinage of new three-cent and half-cent pieces for circulation in the United States has been proposed, and specimens of them have been made for approval by Congress. The distinctive feature of these new coins is that they are made from nickel. The three-cent piece is slightly larger than the nickel five-cent piece, but in order to readily distinguish it from the latter it has a small hole bored in its center. It is considered possible that the proposed denominations may materially reduce the present high cost of living by setting a lower standard of prices for articles now selling at five cents and one cent each.

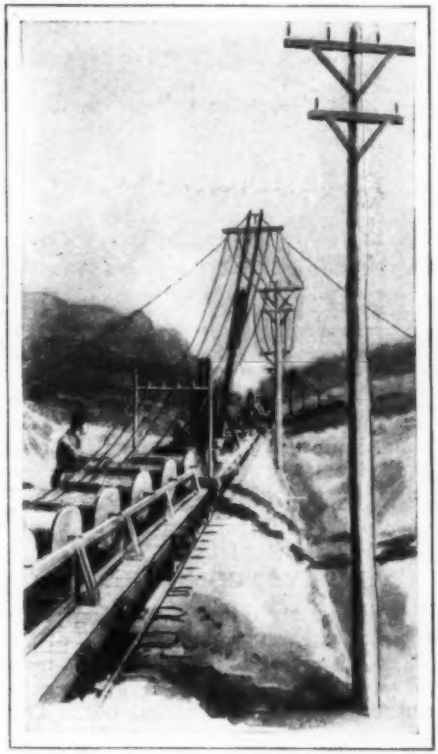
SLEIGH WITH AUTO TOP

A sleigh, the body of which is covered by a regular automobile top with a full set of storm curtains and large celluloid lights, is now on the market. The body frame is made of hard wood, and the panels and dash are steel with pressed-in moldings. The body, which has one door at each side, is mounted upon platform springs that have been designed to equally distribute the weight and overcome the jerky motion incident to sleighs with a rigid platform.



DERRICK CAR STRINGS SIX WIRES AT ONCE

The overhead work of an electric railway in Massachusetts was completed in record time by the use of an ingenious derrick car which strung six wires at a time on top of the transmission poles. The wire reels were mounted on a large stand on one of the cars of the work train, each reel being fitted with a band brake, so that constant attention would not be required. It is claimed that this outfit, operated by four men, ran the six wires distances of from 18 to 24 miles per day.



Special Derrick Car Stringing Six Wires at a Time

¶It is said that the Postoffice Department is to spend $1,000,000 for motorcycles for its mail collectors.

PORTABLE ASBESTOS HOUSE FOR GERMAN EMPEROR

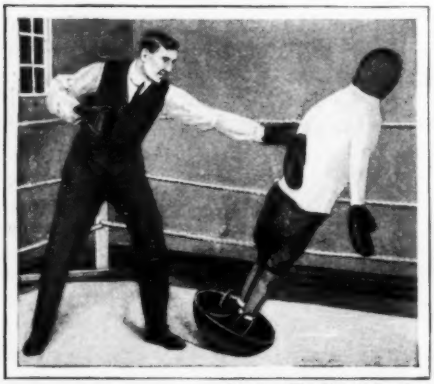
A portable asbestos house, instead of a tent, is used by the emperor of

Portable Asbestos House Used by German Emperor When in the Field

Germany while he is in the field conducting military maneuvers. His personal bodyguard may be seen flanking each side of the structure, while the imperial ensign is hoisted at the left.

A BOXING "DUMMY" THAT ALWAYS "COMES BACK"

This dummy figure for boxing practice has the remarkable faculty of always "coming back." That is, it may be pounded all over the ring, yet cannot be knocked down and out. The



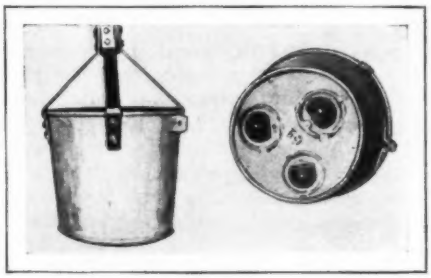
Courtesy The Sketch, London

Practicing Boxing with a Dummy Which Cannot be Knocked Out

reason for this is the weighted, saucer-shaped base. The legs of the dummy are made of steel, and the body and head are inflated like a football. Excellent footwork practice is provided, for the weighted base makes the dummy bob about in the ring in a disconcerting manner.

BUCKET FOR BAILING OUT POLE HOLES

This bucket for bailing water out of pole holes is a heavy galvanized pail, into the bottom of which is soldered three flat valves from an ordinary hand pump. When the bucket is pushed down into the hole the water opens the valves and fills the receptacle. The lifting of the pail out of the hole causes the valves to close and the water can thus be raised and poured out. The invention is very useful in constructing pole lines through swampy grounds



Pail with Valves in Bottom for Lifting Water from Pole Holes

which entail considerable difficulty in keeping the holes free from water while they are being dug.

A BROOM THAT MAY BE RENEWED

A new broom recently placed on the market is so constructed that the broom brush, or broom-corn part, may be renewed when worn out. The handle of this broom is provided with a metal holder, into which the brush portion is fitted and held by a wire device. When the brush is worn out the user substitutes a new brush, and the broom becomes as good as new again.

Lincoln Beachey Having Fun with the Occupants of an Automobile in a Race

AEROPLANE PLAYS TAG WITH AUTOMOBILE

Lincoln Beachey, the "circus rider" of the air, is here shown in one of his characteristic races with an automobile. In these "stunts," which have become the greatest drawing card for county fairs, Beachey swoops down so close to the automobile that the front wheel of the aeroplane almost touches the heads of the occupants.

PURITY OF WATER IN SWIMMING POOLS

Unless particularly cared for, the swimming tank provides a fine medium for the spread of diseases, and the question of just how much care is necessary depends upon the frequency of the tank's use and the cleanliness of the bathers. In all well-regulated swimming tanks the bathers are required to take a shower bath before entering the water. The water is kept much purer, however, by placing hypochlorite of lime in it twice a week. The proportion is one part of available chlorine to one million parts of water.

FIREMEN DIRECT STREAM THROUGH RING

One of the practice "stunts" of British firemen is to aim streams of water through a ring mounted on a standard about the height of a lamp-post. It is not difficult to hit the ring, but keeping the stream rushing through it is said to be an excellent exercise for the development of steadiness of aim.

¶Capturing wild ducks with oil upon the water was recently proved to be possible when the drain pipe of a tank of whale oil in the state of Washington broke and the sticky liquid spread over the water. Hundreds of sleeping ducks found themselves unable to fly the next morning as the oil had glued their feathers together.

Winter Sports in the "Play-

A DOUBLE SLED THAT CARRIES THREE

COURTESY, THE GRAPHIC

A POPULAR COASTING COSTUME

COURTESY THE GRAPHIC

COURTESY THE SPHERE

COMFORTABLE AND SENSIBLE FOR ALPINE SKI-RUNNING

GETTING BACK BY THE EASY METHOD

COURTESY THE SPHERE

IT IS THE VISITORS, MOUNTAINS AND

ground of Europe
A BOB-SLED WITH POINTED HOOD ROUNDING A CURVE ON THE CRESTA RUN
COURTESY OF THE SPHERE
CARRYING DOUBLE
COURTESY OF THE SPHERE
COASTING DOWN THE FAMOUS CRESTA RUN
COURTESY OF THE SPHERE
A CANADIAN SKATER LEAPING OVER SIX CHAIRS ON AN ALPINE LAKE
COURTESY OF THE SPHERE
A SINGLE TRACK SLED STEERED LIKE A BICYCLE
COURTESY OF THE GRAPHIC
NOT THE NATIVES, WHO TURN THE SWISS LAKES INTO SCENES OF GAYETY.

FLOWER GARDEN USED AS SALESROOM

A merchant of Los Angeles converted the yard in the rear of his downtown store into an attractive salesroom by removing the old boxes and rubbish that had accumulated there and planting in their place a variety of flowers, palms, and shrubbery. The novelty and beauty of the garden attract hundreds of people and many of them become customers of the man who devised this type of outdoor salesroom.

Rear Yard of Los Angeles Store Converted into a Garden Salesroom That Wins Customers

DARKEST LONDON TO BE LIGHTED UP

London will be one of the best lighted cities in the world when the installation of a new system of centrally suspended lamps using high-pressure gas with inverted burners has been completed. Although the amount of illumination will be increased by 600,000 cp., it is estimated that a saving of about $34,000 per year will be made over the old system.

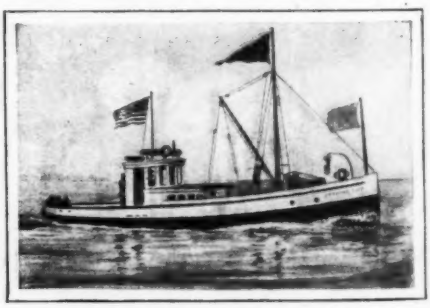
¶At the beginning of 1912 there were approximately 12,433,000 telephones and 29,566,000 miles of telephone wire in use in the world.

LOST METAL PIPES FOUND BY ELECTRIC DEVICE

The exact position of underground metal pipes laid many years ago and later discarded is now determined by means of an electric device that has been adopted by the water department of the government of Washington. The apparatus is so constructed that an intermittent current of electricity is forced through the pipe whose location is not known, by connecting each of the two wires of the device to the exposed terminals of the pipe. A coil of wire connected to a telephone receiver is then carried over the area between the pipe terminals until the position of the lost pipe is indicated by a ticking sound in the telephone receiver. The ticking is loudest when the coil is directly over the buried pipe.

TOWBOAT OPERATED BY ONE MAN

A motor towboat that was designed especially for control by one man is being operated on Puget Sound, and is attracting widespread attention among marine men. The boat is 48 ft. in

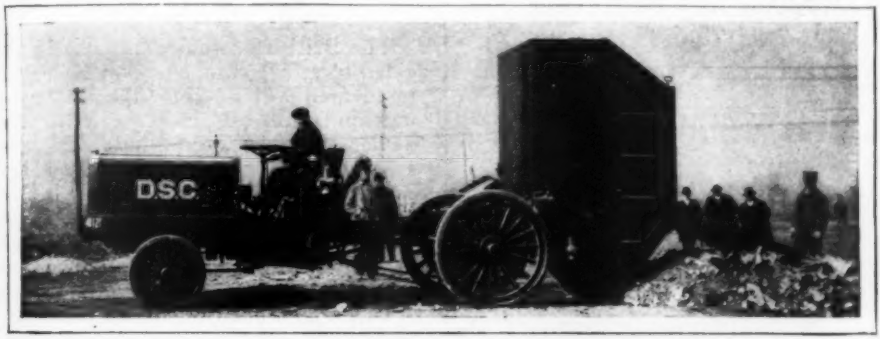


A Motor Towboat on Puget Sound That is Operated by One Man

length, has 11 ft. beam, 5½ ft. draft, and is equipped with a 50-hp. 3-cyl. engine. The craft is so constructed that one man is able to handle the motor, the wheel, and the towing bitts without assistance. Full control of the motor is obtained direct from the pilot house, which is just forward of the towing bitts, thus making it unnecessary for the pilot to leave the wheel. Access to the engine room is gained by means of short stairs on the starboard side, and berths for two persons are provided in the forecastle. Ample light for illuminating the boat and operating its powerful electric searchlight is furnished by storage batteries and a generator driven by the engine. The towboat, which also carries about 700 gal. of fuel in tanks placed in the hold, is used for transporting heavy freight and towing big booms of logs from the logging camp on Brown's Bay across the Sound to Seattle.

PRISONER INVENTS MOTOR DUMPING CAR

A prisoner at Sing Sing has invented and perfected what is pronounced the best type yet constructed of a self-dumping motor car for city use. So successful were the tests of this car that the New York Service Commission has adopted it as the best and cleanest car, and large numbers will be built at once. The illustrations explain its construction and operation. The box is built of sheet steel, and the doors through which ashes and garbage are loaded are arranged to make loading easy; when closed, there can be no escape of smell or contents. The load is instantly emptied by a lever which requires little force to operate.

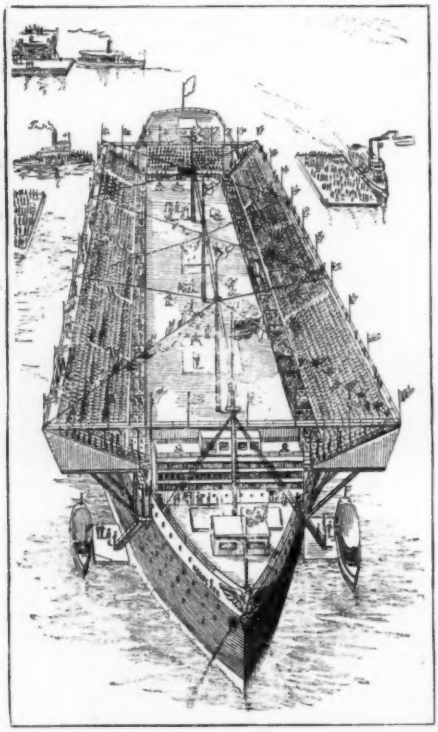


Motor Dumping Car Invented by Prisoner

¶Among the latest coin-in-the-slot machines is one for cleaning tobacco pipes. It is electrically operated.

A FLOATING CIRCUS AND MENAGERIE

Plans for building a vessel to be known as "Noah's Ark" and upon which will be carried a complete circus



Novel Deck Arrangement for a Floating Circus and Menagerie to be Known as "Noah's Ark"

and menagerie have been completed by a resident of the state of Washington. The length of the proposed ship is to be 535 ft., with an 80-ft. beam when the arena is closed and the vessel has been made ready for a voyage. By means of a special arrangement, however, the deck houses extending along each side of the main deck can be moved under the seats, thus making a space 350 ft. long and 125 ft. wide available. This arrangement will provide 12 tiers of seats, or capacity sufficient for seating approximately 7,500 persons, and a clear space for the performers of about 300 ft. by 50 ft. The ship will be propelled by oil motors instead of steam engines, thus dispensing with funnels and enabling the audience to obtain an unobstructed view of the performances in the arena. It is planned to launch the vessel in time to visit the leading American and European ports before attending the Panama-Pacific Exposition at San Francisco in 1915.

ENGLAND REFUSES TO PAY FOR "TITANIC" MAIL

The British postoffice has finally decided to refuse compensation for registered mail lost on the "Titanic." An indemnity of $10 is payable to the owner of any registered letter or package lost in transit to any foreign country through negligence on the part of the mail service or transportation line. If negligence had been admitted in the case of the "Titanic," the amount payable would be in the neighborhood of $4,000,000, but the British postoffice authorities take the ground that the disaster was "due to causes beyond control."

SELF-CONTAINED ALCOHOL HEADLIGHT FOR AUTOS

One of the newest automobile headlights employs alcohol as a source of light, the reservoir being part of the lamp. This makes possible the removal of one or both the headlights from the brackets to provide a strong light when tires have to be repaired or parts of the machine tinkered with at night.

One filling of the lamp requires a little over a quart of alcohol, and will burn about 20 hours. It is claimed that these lamps throw a beam of light a distance of about 600 ft. The alcohol vapor is fed to a mantle burner.

¶Three tons of sample paving brick were mailed at one time by a brick dealer of Gary, Ind., when the parcel-post law went into effect on January 1, 1913.

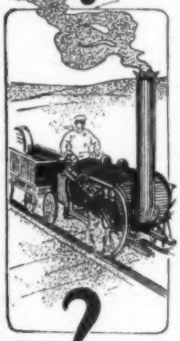
WHAT GOOD IS IT?

BY A LICENSED AIR PILOT

ROBERT FULTON stepped ashore amid the plaudits of the crowd. The trial trip of the "Clermont" had been successful and he was receiving congratulations from all sides. Suddenly he noticed his friend the Immortal Skeptic approaching, and after the conventional greetings were said, Fulton asked:

"Now then, what do you think of *that?*"

The old gentleman shook his head sadly. "Well, Bob," (skeptics always talk like that), "well, Bob,—your boat *runs* all right, but what *good* is it?"



Some time afterward, the Immortal Skeptic, who had been traveling on the Continent, happened to be present at the first public trial of Stephenson's locomotive. He watched the little engine cough its way over a short stretch of planking, admired the ingenuity displayed in its design, but again his verdict was—"What good is it?"

Years passed, and the Immortal Skeptic was kept pretty busy with the telegraph, the cotton gin and the bicycle, until one day he came upon Mr. Selden who was industriously tinkering with his "horseless carriage." At last the little car started, but the Skeptic, who strolled along beside it, muttered—"How can people waste their time so? Now, what possible good is *this?*"

Only a short time afterward, the Immortal One—people had begun to call him "the Knocker"—was in North Carolina, where he saw the Wright brothers' aeroplane make its first successful flight. He was impressed, but when asked for his opinion, all he said was—"Boys, you have a wonderful thing there, but *what good is it?*" And here, for the first time in all his long and varied experience, he found men who realized the limited possibilities of their invention. *For what good is the aeroplane?* With the possible exception of employing it in war, it is no good: there is nothing that an aeroplane can do that cannot be done surer, safer, and as fast, by some other vehicle. This was true when the Wrights first got off the ground and it is true today.

? ? ?

For the aeroplane has not made the rapid strides that were expected in the early days, and it is no nearer being a commercial vehicle today than it was nine years ago. It is my good fortune to have piloted machines that are the very last word in French design and construction, yet, aside from the finish, they are absolutely no improvement over the old birds that made records and widows at the first Rheims meets. That the French machines are superior to their contemporaries is shown by their recent performances at Chicago, yet, on them, the vital problem of stability is as far from solution as ever. They take weeks to master and they are very, very far from being commercially fool-proof. A loose bolt here—a wire jammed there—a puff of wind when flying low—and another airman has gone, just as they have been going for years.

The fact that aeroplanes fly higher, faster, and farther than they did at the start proves nothing except that motors have improved and that pilots have more self-confidence; the aeroplanes are just where they have always been. A good instance of this was the Circuit of Britain Race last year. Beaumont, in a monoplane different in motor only from the original Bleriot that crossed the English Channel years before, won over a number of more or less improved machines, including a Nieuport, regarded by many as the ideal aeroplane even today. People said, "What a wonderful performance! Soon we'll all be doing that!" Not unless they are all Beaumonts! That was over a year ago; are those people any nearer to the realization of the dream?

How can the aeroplane ever become a practical commercial vehicle? To carry heavy weights, an aeroplane must have a large supporting area; yet there is an obvious structural limit and it is very easy to reach. If we make a machine of any considerable size, so much attention must be paid to strength in construction that efficiency suffers as a result, and the necessarily high power must be made higher to offset this inefficiency. The performances of such large-area machines that I have seen were far from encouraging; they were slow in leaving the ground and, once in the air, they were dangerously slow in answering the controls. In very light side winds they drifted terribly, and in ordinary winds they could make hardly any progress at all.

Both here and abroad attempts have been made at giant machines designed for four or five passengers, but they have invariably proved unsuccessful. Perhaps the best known of these is the Bleriot limousine which, although it *flies*, has never carried passengers inside the inclosed body. When loaded with sandbags equivalent to the weight of the persons to be carried, the machine was "loggy" in the air and could only reach a ridiculously low altitude.

What are the possibilities of the aeroplane as a carrier of light weights, such as mail? For perhaps two hundred dollars' worth of letters we have an airman risking his life and a four-thousand-dollar machine — and what good is one, or perhaps two bags of mail matter when it often requires an entire railroad car to deliver it to even a comparatively small city? Then let us consider it as an emergency means of communication. Would not storms and forest fires put aeroplanes out of the running even sooner than they would trains, telegraphs and telephones? Obviously, yes.

Then, if aeroplanes are impracticable as passenger or freight-carrying conveyances today, just as they have always been, why hasn't some one improved upon them?

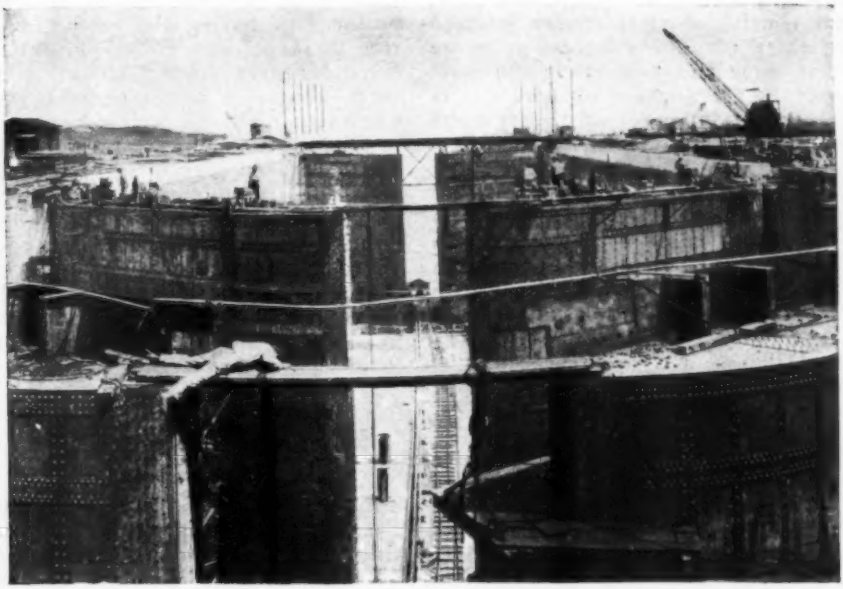
For the last decade more people have worked on aeronautical problems than, perhaps, on any other single science. What is the result? A number of automatic-stability devices have been invented, of which a few were tried and forthwith abandoned; helicopters, ornithopters, multiplanes, paraplanes, and a myriad of other machines, have been built and never flown, and still the biplane and the monoplane are exactly in the same stage of development as they were at first.

Have we reached the types that are here to stay—the ultimate aeroplanes? If we have, the commercial aeroplane is only a dream and will remain so.

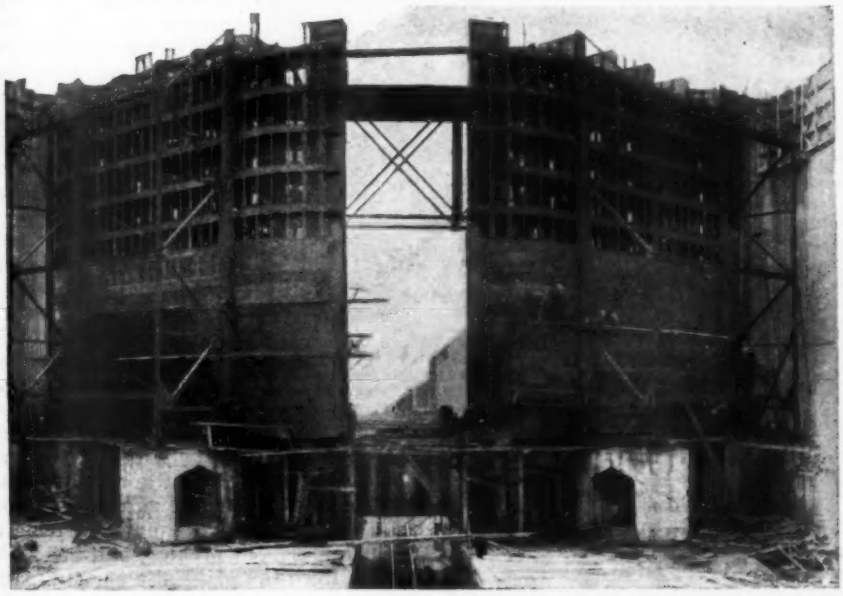
STRUCTURAL EXACTNESS OF PANAMA LOCK GATES

Even engineers, who take for granted the precision or accuracy with which the different parts of great engineering undertakings fit together, such, for instance, as the almost exact meeting of the bores of a tunnel driven from opposite sides of a mountain, are impressed by the accuracy of construction of the gates for the Panama Canal.

The lock gates are 46 in number, all



Gatun Upper Locks, West Chamber, Showing Construction of Three Sets of Gates



Appearance During Construction of Upper Guard Gates in the East Chamber of Gatun Upper Locks

of which are of the straight-leaf type, and consist of steel frames covered with steel plating. All these gates are 65 ft. wide and 7 ft. thick, the main operating gates having a height of from 77 to 82 ft., while the guard gates range from 47 ft. 4 in. to 66 ft. Yet in erecting the largest of these gates, each composed of an aggregate of many separate parts, the greatest variation from the true vertical of the gate edges was ⅛ in., and the greatest variation from its planned height less than ¼ in. With the gates mounted on their hinges, with bracing castings in place and ground, the deviation of adjacent bearing surfaces rarely exceeded .005 in. The importance of having the gates exactly true in shape caused the engineers to lay great stress upon accuracy in the shop, according to Engineering and Contracting. So a special machine was installed in the contractors' works, by which both ends of the girders could be planed at the same time. This machine was to remain unchanged in position until all the girders were completed. In the field fine wires were used to check the shape of the skeleton as erection proceeded, so that errors could be observed and promptly corrected.

AEROPLANE CONVERTED INTO POWER SLED

This perfectly adequate motor sleigh, used in Mainz, Germany, was made by mounting the body, engine and propeller of an aeroplane on runners. It was assembled by a German airman for use during the months in which the cold makes flight uncomfortable.

Motor Sleigh Made by Mounting Aeroplane Body, Engine and Propeller on Runners

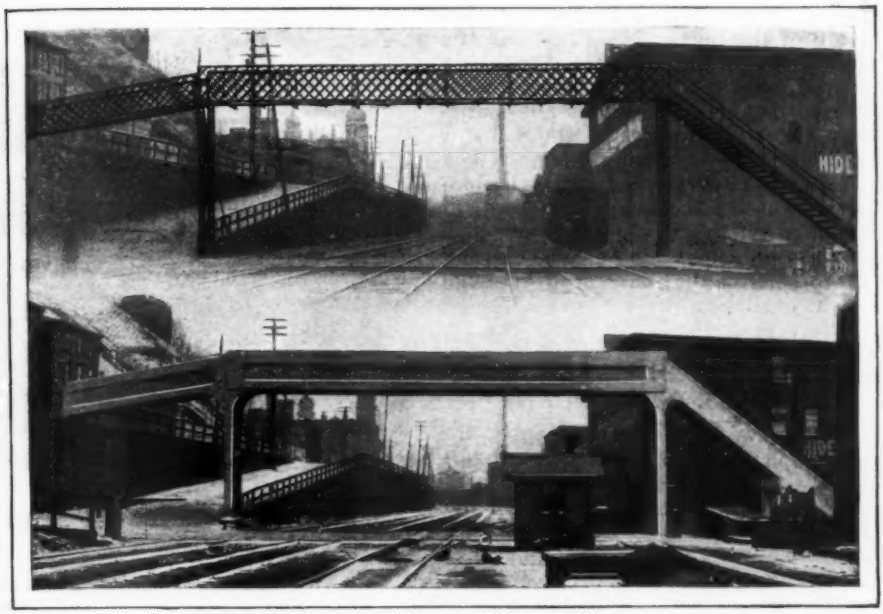
¶A concrete foundation slab, 600 ft. long, 34 ft. wide, and 9 in. thick, was recently laid for 80 coke ovens near Mt. Pleasant, Pa.

CACTUS IS DRUG MOST USED BY PHYSICIANS

In an attempt to determine just which of the vegetable drugs are most utilized by the practicing physicians of the country, whether regular, eclectic or homeopathic, a comprehensive list was sent out to 30,000 practitioners. Care was taken to exclude all specialists, and to have every part of the United States represented. More than 10,000 answers were received. The drug heading the list was cactus, which, according to Clinical Medicine, was a genuine surprise. The number of votes it received was 6,239. The next seven, in the order named, were hydrastine, aconite, gelsemium, ipecac, digitalis, ergot and belladonna.

Cactus is a purified extract of a special variety of cactus plant growing in a certain soil in Mexico, and has to be taken from the plant at a certain stage.

¶A 3-ton motor truck was driven 40,000 miles without breaking down, and six months' repairs cost only $2.70.



Steel Footbridge on Pine Street, Pittsburgh, as Originally Built—Same Bridge as It Now Appears Covered with Cement

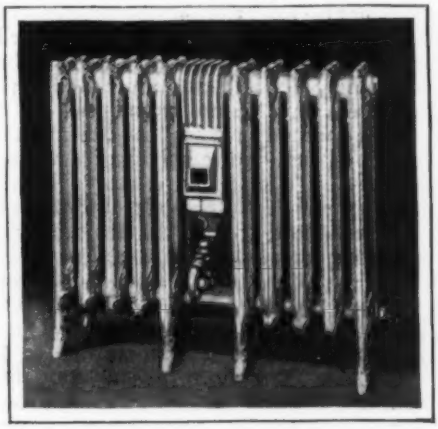
STEEL BRIDGE REINFORCED WITH CONCRETE

The steel footbridge on Pine Street, Pittsburgh, was recently reinforced with concrete by the Department of Public Works of that city in a very simple manner. When the bridge, which was originally built about four years ago, was found to be corroding and deteriorating in strength, due to gases from the railroad locomotives that pass under the structure, it was decided to remedy the difficulty by covering the framework of the entire bridge with cement. The two approaches, the floor, the latticed sides and supporting columns were therefore used as a framework for the cement, which practically makes the remodeled structure a reinforced concrete bridge of great strength and long life.

¶ Liverpool is to have the largest organ in the world. It will have 10,567 pipes, will take four years to construct, and will cost $450,000.

RADIATORS AUTOMATICALLY HEATED WITH GAS

A new type of radiator that holds water which is automatically heated with gas from a burner placed midway between the coils is being manufac-



Hot-Water Radiator with Automatic Gas-Heat Control

tured. When heat is desired the pilot lamp of the burner is lighted and the indicator of a thermostat, conveniently placed upon the wall, is set at the required degree mark. This automatically turns on the gas in the radiator and when the temperature in the room rises to the degree desired the thermostat turns off the gas. This form of radiator does not require water-pipe connection and may be used in any room where either natural or artificial gas is available.

WASHINGTON HOTEL HAS SILVER-PIPE ORGAN

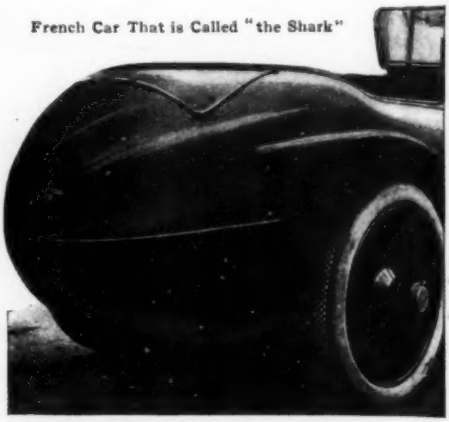
The new pipe organ recently installed in a Washington hotel is unusual in that all the pipes which produce the high notes, ranging from the middle soprano register upward, are made of silver. It is claimed that these pipes give forth tones of exceptional purity, the imitation of the human voice, when the vox humana stops are used, being remarkable.

MEASURING MOUNTAINS WITH THERMOMETERS

The thermometer, considered by the public at large as an instrument whose reason for being is only the measurement of heat, is also an important instrument for the measurement of mountain heights. Thermometers used for this purpose, however, have to be extremely delicate, and are called hypsometers or thermobarometers.

The method of using the thermometer to determine the height of a mountain is by taking the exact temperature at which water boils at different heights. The greater the atmospheric pressure, the greater is the amount of heat required to boil water. Water boils at 212 deg. F. at sea level, and for approximately every 555 ft. of ascent will boil at a temperature of 1 deg. less. Therefore, as an example, if water is found to boil at a temperature of 190 deg. F., the indicated height above sea level is 12,210 ft.

French Car That is Called "the Shark"



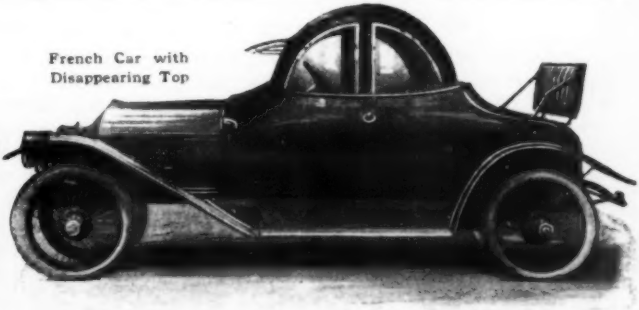
MOTOR-CAR BODIES OF ODD DESIGN

Two views show an automobile with a semicircular top which, in one illustration, is lowered entirely out of sight by separating it into a front and a rear section and dropping them into spaces inside the body; that is, one section is lowered behind the seat and the other is dropped down between the steering wheel and the body. Side and end views of another type of car are shown. This has its front lights placed at the extreme end of the mudguards and the body in general gives the impression of some marine monster.

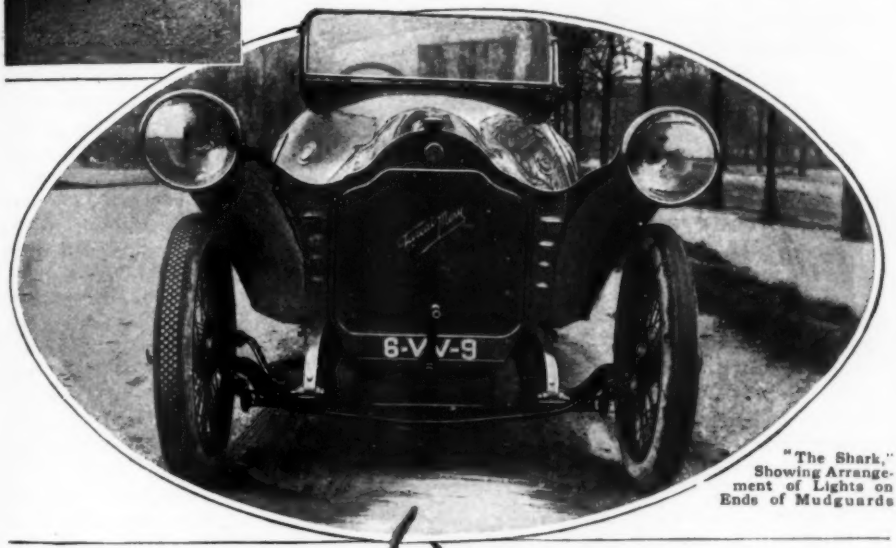
SUBMARINE BOAT PURSUED BY ITS OWN TORPEDO

A French submarine was recently pursued by its own torpedo which, when fired, went a short distance and then turned and headed toward the submarine at great speed. Although the vessel was unable to escape entirely, its commander succeeded in getting up speed sufficient to prevent an explosion when the torpedo struck the boat.

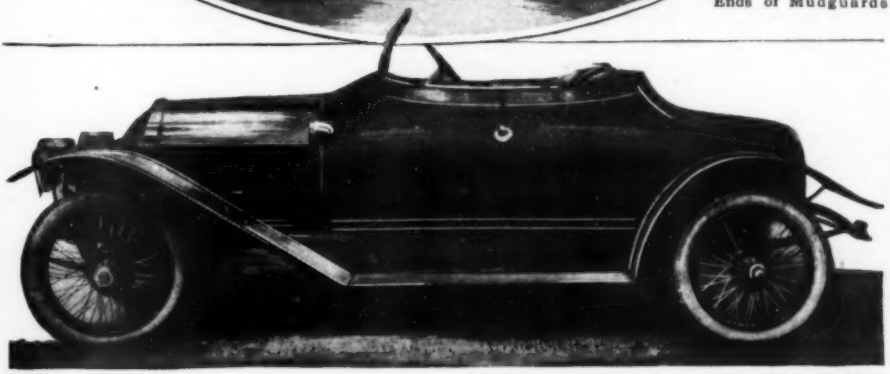
¶It is estimated that 700,000,000 fish were caught in the waters off the east coast of England during the past year.



French Car with Disappearing Top



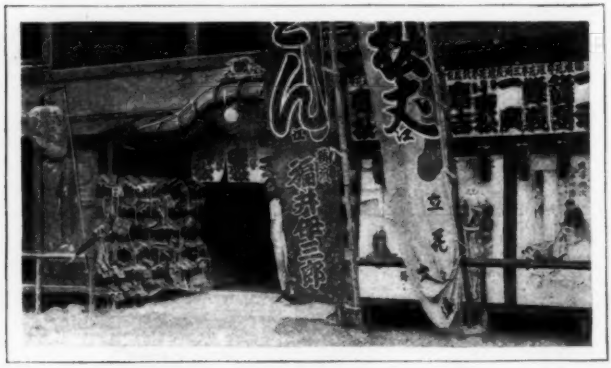
"The Shark," Showing Arrangement of Lights on Ends of Mudguards



French Disappearing-Top Car, with Top Dropped Inside of the Body

MOVING-PICTURE THEATERS IN JAPAN

Even the remotest towns in Japan have their moving-picture shows, and in large cities they seem to be nearly as plentiful as on this side of the Pacific. In Yokohama there is a whole street of them, and as the program of each is endless and each picture is announced in huge symbols on a separate variegated banner flying from a tall bamboo pole, the aspect of Theater Street is startlingly unique. The pictures illustrating the sensational points of the programs above the entrances and at their sides have a certain quaintness about them, which is accentuated by the fact that they are all originals, not mere stereotyped advertisements printed in raw colors. The "getas" or wooden sandals of the spectators are deposited on a rack before the entrance to a moving-picture show, for where other people take off their hats, the Japanese leave their shoes.



Japanese Moving-Picture Theater, with Native Posters, and Sandal Rack at Entrance

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¶The first automobile journey between Dawson, in the Klondike, and the navigation head of the Yukon River was made recently in 35 hr. 50 min., actual running time, by the Governor of Yukon Territory. The temperature ranged from 30 above to 15 deg. below zero.

THE SHIPPING OF LIVE LOBSTERS

The man or woman in a city a thousand or more miles from the sea, served with a lobster which was alive but a few minutes before its appearance on the table, may wonder, perhaps, how they are shipped alive. The process of getting the live lobster from its home off the Maine coast, for instance, to a city far inland, is very systematic. The lobster-fishery company usually owns a fleet of vessels built for speed, having the graceful lines of yachts, and many of them, according to the Fishing Gazette, would keep yachts noted for speed busy in trying to pass them. The vessels are fitted with wells in which the lobsters are carried from the fishing grounds in their natural element, the pure cold waters of the Maine coast. When these vessels arrive at the wharf, the lobsters not required for immediate orders are placed in floating boxes, so arranged that a constant flow of water passes through them. The lobsters required for shipment are taken from these boxes by means of dip nets, and are then placed in buckets and hoisted to the shipping rooms to be packed in the famous refrigerator packages. These consist of half and quarter barrels, containing wire cages for the lobsters, the cages being surrounded with seaweed to keep the lobsters from coming in contact with the ice. A wooden cover is placed on top of them, and a round cake of ice, fitting the top of the package, is placed on the cover. This is finally covered with burlap, and the package is hurried to the depot.

¶A new automobile wheel-rim gauge instantly gives the most suitable size of tire for any given rim.

CONCRETE IN ITS NEWER DEVELOPMENTS, AS SEEN AT THE CEMENT SHOW

By FRANK PARKER STOCKBRIDGE

CONCRETE has passed the experimental and fantastic stages, through which every new development has to go. That, at least, is the main impression I gained from a visit to the Sixth Annual Cement Show held in Chicago in January, 1913. A few years ago, everybody was getting rich quick —or trying to—by the simple process of manufacturing concrete blocks with hand machines, of which there were hundreds on the market. Such few block-molding devices as were shown at this 1913 show were mainly those designed to make some new form of block, intended to overcome the objections that have developed to the older forms.

Beyond the general effect of solidity and stability the principal impressions I gained at the show were:

A general effort, apparently successful, to devise means of making concrete waterproof;

A marked tendency to do away with the costly and cumbersome wooden falsework for poured concrete structures, and the substitution of adjustable and re-usable forms, principally made of galvanized sheet steel;

A pronounced development of better adapted tools for the simpler forms of concrete construction;

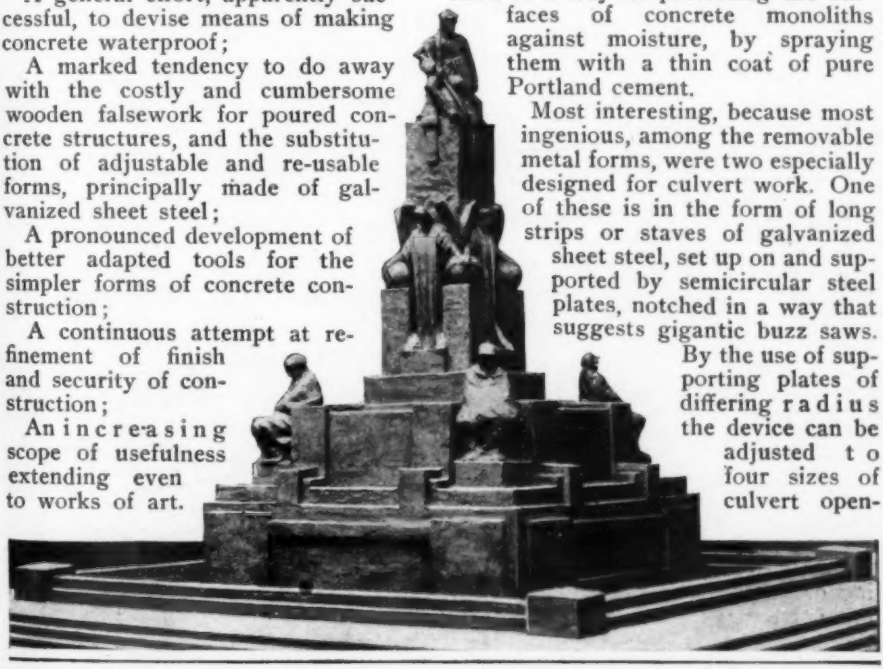
A continuous attempt at refinement of finish and security of construction;

An increasing scope of usefulness extending even to works of art.

Demonstrations of various waterproofing devices and compounds at the show were convincing. The exhibition of a block composed of only one part of cement to five of sand, standing for days with water at a pressure of 60 lb. to the square inch forced against one side, while the block apparently did not absorb a drop, was the way in which the manufacturers of a waterproofing compound, designed to be mixed with the water used in making the concrete, demonstrated their wares.

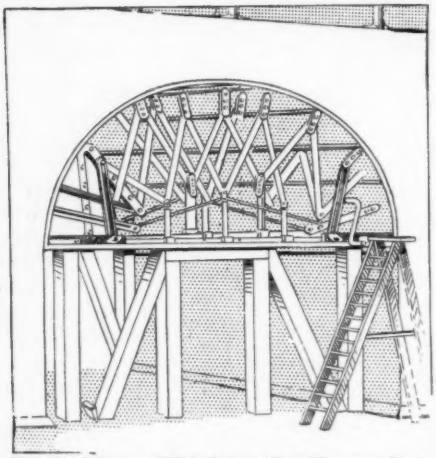
Another waterproofing compound, in the form of a dry powder for mixing with the dry cement, gave an equally conclusive proof of its value in the manufacture either of blocks or of poured structures, while the much-talked-of and efficient "cement gun" showed a way of protecting the surfaces of concrete monoliths against moisture, by spraying them with a thin coat of pure Portland cement.

Most interesting, because most ingenious, among the removable metal forms, were two especially designed for culvert work. One of these is in the form of long strips or staves of galvanized sheet steel, set up on and supported by semicircular steel plates, notched in a way that suggests gigantic buzz saws. By the use of supporting plates of differing radius the device can be adjusted to four sizes of culvert open-



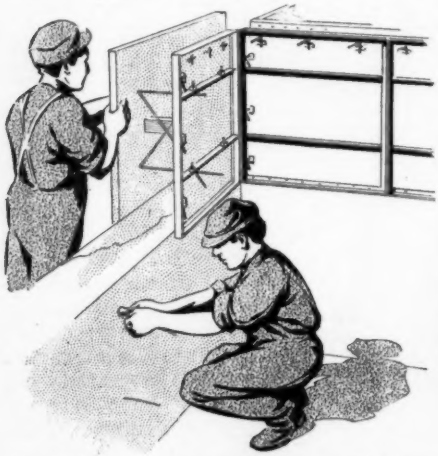
Charles J. Mulligan, Sculptor — John Devereux York, Architect

This Monument to Billy Rugh, the Newsboy Hero of Gary, Ind., is to be Built of Concrete, 40 Ft. High, the Figures being Carved from the Same Material



The Metal Staves of This Culvert Core Slide over Each Other and can be Adjusted to Any Size

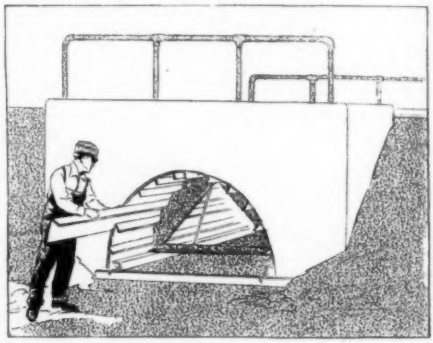
ings. The other culvert form that attracted attention also employs the principle of overlapping metal staves, but these are permanently fastened to a jointed framework of steel bars in such a way that the whole apparatus can be adjusted to form a culvert open-



These "Unit" System Forms for Concrete Walls can be Combined and Locked Together in Any Shape

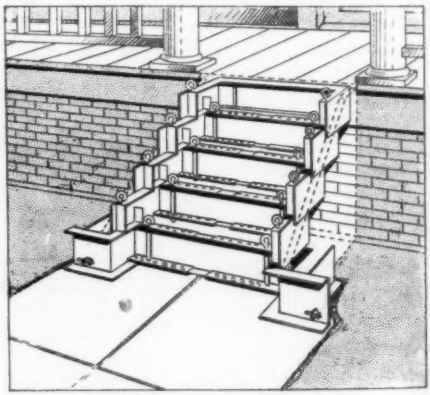
ing or bridge arch of from 3 to 6-ft. radius, either semicircular or flattened. The same manufacturers showed a round culvert core adjustable in the same manner from 20 to 48-in. diameter.

Several kinds of sheet-metal forms, stiffened with angle bars, for straight or curved wall construction, were shown. One of these, that was much commented on, was built on the "unit" system, an ingenious-looking device making it possible to combine various units in almost any desirable manner, and to set up the molds for an entire wall, or the four walls of a building,



A Metal Core for Culverts, Having Removable Staves of Galvanized Sheet Steel

in a very short time. In setting up these molds the spacing between them, gauging the thickness of the wall, is determined by wooden blocks which are removed as the concrete is poured. The molds are kept from spreading by crossed wires passing through holes in the metal and stretched tight. These

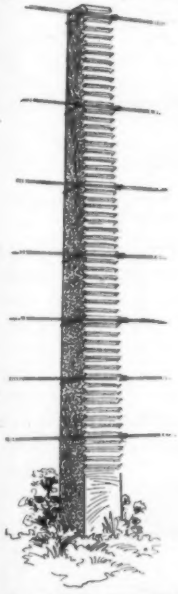


Metal Molds for Concrete Steps That Save Time and Lumber

wires not only serve as a brace against the outward pressure of the concrete, but are left in the walls permanently, contributing some reinforcing power and serving as guides to hold rods or other reinforcement in place as the pouring proceeds.

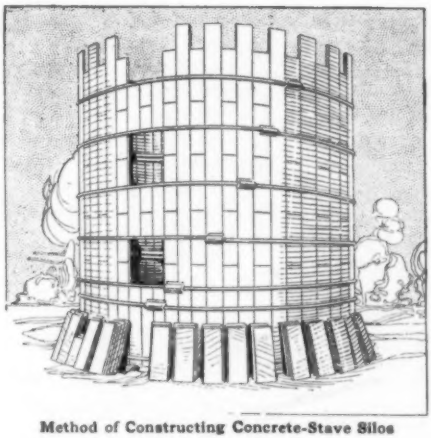
Several very clever metal forms for smaller classes of concrete work were shown by one company. One of these was an adjustable form for building steps, constructed of No. 14 gauge sheet steel and adjustable not only as to height of riser, but also as to depth of tread. Plates attachable to extensions at the base of the stair molds enable wooden side-wall molds to be added for forming a coping if desired.

The increasing use of concrete on the farm was emphasized by the exhibition of an ingenious metal mold for casting concrete fence posts without the troublesome holes or staples for the fence wire, which have made concrete posts unpopular in some sections. This form of post is cast with a series of horizontal corrugations, extending from the ground to the top of the post, enabling wire to be stretched at any desired height, and held in place by the simple method of tying it to the post with smaller wire. These molds are made in "batteries," to cast 6, 12, 18 or 24 posts at one pouring, and are fitted with slots to hold the reinforcing material, consisting of a strip of hoop iron imbedded an inch below the surface in each corner of each post.



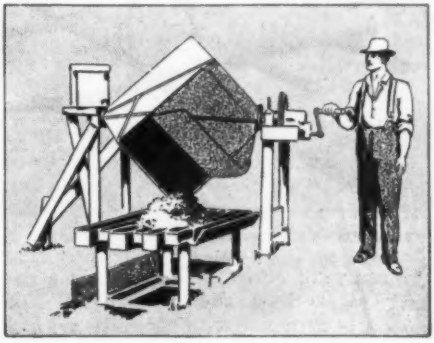
Corrugated Concrete Fence Post, Making Wiring Easy

For the farmer, too, were shown several metal forms for pouring monolithic silos, and one exhibitor showed a complete silo constructed exactly like a wooden tank, with the exception that the staves were cast of reinforced concrete in short sections; the advantage claimed being the saving of time in building the silo and the avoidance of expansion cracks, since each stave could take care of its own contraction and expansion without crowding its neighbors or pulling away from them far enough to leave an opening. Another proof of the increasing use of cement on the farm was an illustration of a simple, homemade concrete mixer, on the principle of the old-fashioned box churn, which anyone handy with tools could construct with the aid of the village blacksmith.

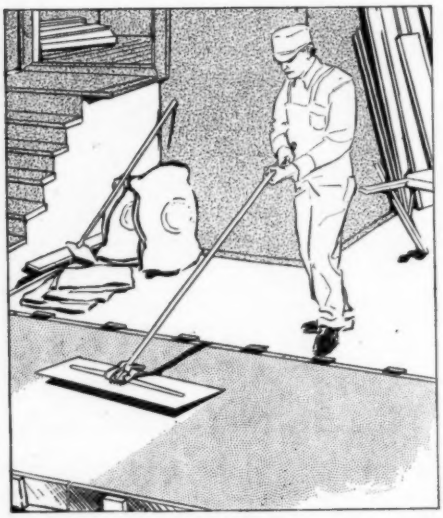


Method of Constructing Concrete-Stave Silos

Among the new tools for concrete

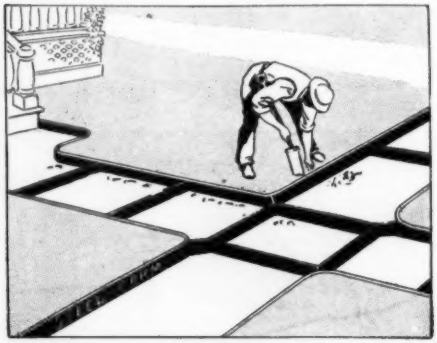


A Homemade Concrete Mixer That is Simple and Efficient



This Long-Handled, Tilting Trowel Saves Backache in Sidewalk Work

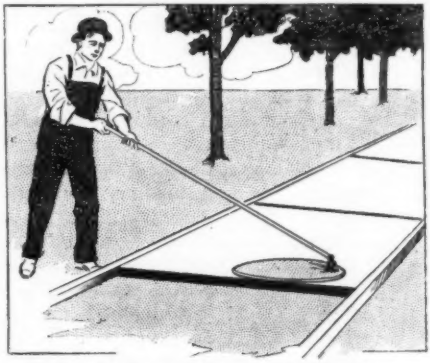
work, two, adapted especially to sidewalk construction, were demonstrated under service conditions. One of these is a long-handled trowel with the handle attached by an automatic tilting device that lifts the edge of the implement in the direction in which it is pushed or pulled, enabling the operator to smooth off the work with a



Metal Forms for Concrete-Sidewalk Construction

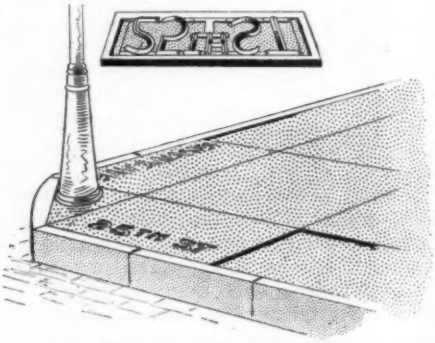
minimum of effort. The other is a rotary steel disk, the long handle of which is attached eccentrically with a universal joint, so that the disk itself, which weighs 8½ lb., may be rotated, yet remain horizontal. This implement is designed to put a "float finish" on sidewalk surfaces.

For sidewalk construction, a simple, but efficient system of adjustable metal forms was also shown by the makers of the rotary float, while an adjustable device, like a printers' chase, for holding metal type with which to stamp the contractor's name, street name or other inscriptions in concrete sidewalks, was another interesting exhibit.



The Rotary Float Which Makes the Finishing of Concrete Sidewalks Simple

Among the new forms of concrete blocks are two of universal interest. One, for chimney construction, is cast in blocks 16 in. square and 6 in. high, the block containing a circular flue, 9 in. in diameter, and four ventilating spaces. An attachment to the mold makes possible the casting of pairs of blocks to include a stovepipe hole,

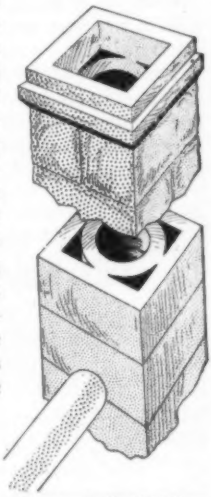


Metal Type and Holder for Stamping Street Names in Concrete Sidewalks

while for the portion of the chimney projecting above the roof special rock-faced molds and another for the cap are provided. Equally novel was a block for wall construction, of a peculiar extended shape, 30 in. over-all by about 10 in. in extreme width, but so shaped as to show a face on either side of the wall not much larger than a common brick. The method of laying these blocks makes each one act as a binder for five others, while a large air space is formed inside the wall.

Beautiful vases, various utensils, bas-reliefs and ornamental devices of many applications testified to the increasing use of cement and concrete as a medium not only of utility but of artistic expression. But what attracted the most attention from every visitor to the show was the model for the concrete monument that is to be erected at Gary, Ind., to the memory of Billy Rugh, the crippled newsboy who cheerfully gave his life into the hands of the surgeons, that useless parts of his body might save the life of another. The whole world has heard the story of Billy Rugh. He died, and now the people of Gary are raising a monument to his memory—a monument 40 ft. high, of concrete. The architect and the sculptor have designed a noble structure, to be cast in concrete made from ground and crushed marble, and chiseled after casting as if it were ordinary stone. The four corners of the pedestal are surmounted by figures typifying various forms of self-sacrifice, and at the top of the shaft is the portrait-statue of the crippled newsboy who gave his life for another.

Concrete Building Blocks of Odd Shape That Give Increased Strength to Walls and Insure Air Space



Chimney Built of Hollow Concrete Blocks, Giving an Air Space in Each Corner

From crude utility to sublime commemoration—such are the new developments of concrete.

MOTION PICTURES SPEAK AS THEY MOVE

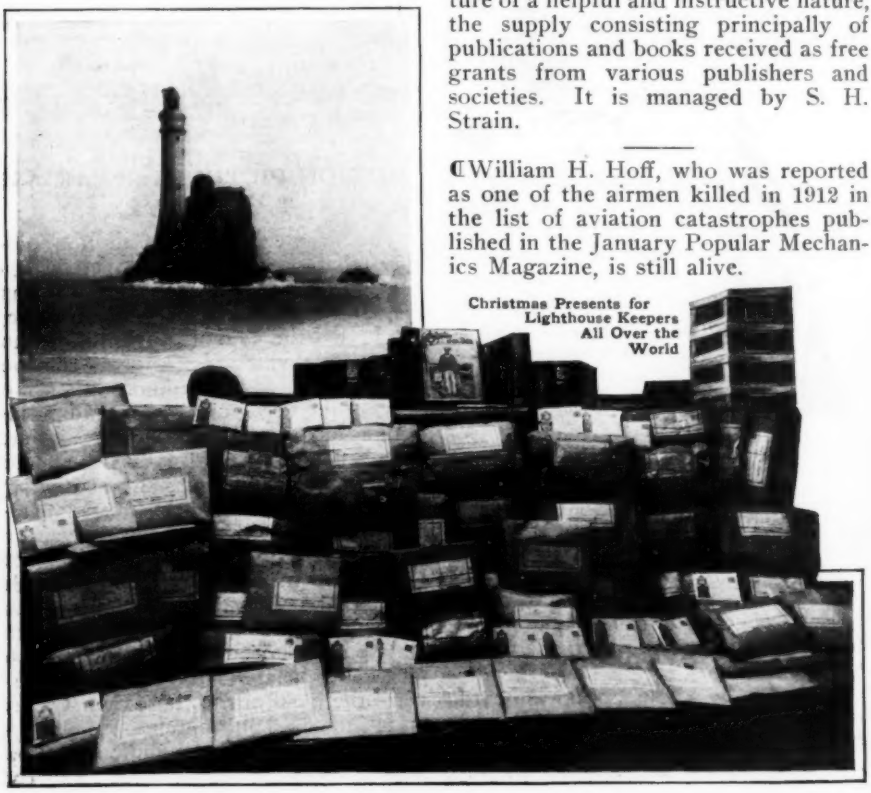
The first exhibition of motion pictures that speak as they move was recently given in the theater of Thomas A. Edison's laboratory, at Orange, N. J., by the famous inventor. The invention, which is known as the kinetophone, is a combination of the moving-picture machine and the phonograph and is so constructed that the sounds one would naturally expect to hear when witnessing a moving picture show are so reproduced by mechanical means that the spectator finds it hard to believe that he is not gazing upon a real stage with flesh and blood actors upon it. Seven films were shown, some of them dramatic and some comic. When actors in the pictures appeared to be walking toward the front of the stage their voices were increased in volume as their figures came nearer to the audience. The speech and other sounds exactly

harmonized with every action reproduced by the films. In one scene the speaking picture dashed a plate upon the floor and the individual sound of each falling fragment could be clearly distinguished from the other sounds. In another reproduction the picture blew a horn and a whistle and then a man came on and played the piano. In still another scene a girl appeared and played upon a violin, and another pictured actress sang some of the old songs while the pictured pianist and violinist accompanied her as in real life. It is claimed that the kinetophone, which is the result of four years of hard work on the part of its inventor, will eventually put the finest operas and the best dramas within the reach of every one.

SENDING "CHRISTMAS" TO LIGHTHOUSE KEEPERS

The Lighthouse Literature Mission, with headquarters in Belfast, Ireland, plays a prominent part in the Christmas of lighthouse keepers all over the world. In the accompanying illustration is shown some of the Christmas presents sent out by the mission. The lighthouse shown in the upper left-hand corner is the Fastnet Light, which, from the navigator's point of view, is the most important outpost in Europe.

The mission was established about 20 years ago to distribute religious literature to lighthouse keepers in all parts of the world. At the same time, the mission sends out general literature of a helpful and instructive nature, the supply consisting principally of publications and books received as free grants from various publishers and societies. It is managed by S. H. Strain.



Christmas Presents for Lighthouse Keepers All Over the World

¶ William H. Hoff, who was reported as one of the airmen killed in 1912 in the list of aviation catastrophes published in the January Popular Mechanics Magazine, is still alive.

COMMENT AND REVIEW

The Parcel Post

AT last the parcel post! What Europe has enjoyed for years has finally become a reality here. As might be expected, the inauguration of the service was characterized by the mailing of various articles of merchandise which were more or less freaky, being sent either in a spirit of fun or for advertising purposes. For instance, the ton or more of bricks which a manufacturer of clay products sent out attracted general attention because the comparison of a letter or postal card with a brick as mail matter appeared ridiculous and suggested the difficulties of the clerks and letter carriers struggling with such heavy articles. But as a matter of fact, a year hence the same man can mail a carload and little attention will result. It is the new and unusual thing that is strange, like the first bicycles that aroused derision and were a frequent mark for stones thrown by the small boy.

The service has thus far been satisfactory to the public, and the indications are that the Department, which was somewhat unprepared, will be able to expand its facilities to keep pace with what will be a steadily growing traffic. The competitive tests of articles mailed and expressed from the same place to the same destination were rather in favor of the parcel post, which in some cases was a full 24 hours ahead of the express companies. The latter, however, will not go out of business, although they will have to modify rates on small packages and pay smaller dividends on watered stock; but while any innovation is disconcerting for a time to the people and industry immediately affected, other occupations and forms of service soon arise to take their place. Some of the express employes may change to postoffice employes, and the companies replace what packages they lose with larger and heavier freight, but there will doubtless be occupation for both the parcel post and the express companies.

The Country Dealer

FOR several years we have had dinged into our ears doleful tales of woe of what was to happen to the country dealer when the parcel-post juggernaut arrived. An analysis of this sentiment, which was and is yet honestly entertained by thousands of small country merchants, is interesting. The suspicion is not wholly wanting that the express companies had very early knowledge of this impending doom; a large number of the trade papers, of which there are hundreds, with a surprising unanimity became obsessed with the idea that a parcel post meant the end of the country dealer, with the easy conclusion, "No country dealer, little need for the trade paper." Hence, for years the trade paper has carried its weekly message of death to parcel post, and little wonder that the dealer became infected.

The main line story was that parcel post was the dream of that arch enemy of the country merchant, the mail-order house. This statement became an accepted fact, not even worthy of discussion. Now, the parcel system will doubtless be of some advantage to the

big mail-order houses, but nothing like what we have been told. The articles which they sell, practical to send by mail, are not so many after all. What the mail-order houses make their money on are not sales under one dollar, but over ten. It costs them practically as much to put a dollar order through the house as it does one for twenty-five dollars. And if their entire business were in single shipments of dollar articles, they wouldn't make much money. The low-priced articles of common use, of which there are hundreds, are sold nearly as cheaply at the corner store. For instance, a man wants a 5-gallon can which his home dealer sells for $1.20. The mail-order house sells the same identical can for 95 cents. But by the time the customer buys a money order and pays for parcel postage it has cost him $1.15. If the buyer is ordering a bill of goods, that's another matter, but the shipment then goes by freight, not parcel post.

Another angle which does not seem to be taken into account, but which very soon will be, is the advantage of the parcel system to the small country dealer. A customer comes in to order, say, an unusual size of screwdriver. Dealer is out; in fact, the last call for one was a year ago, therefore he cannot afford to stock up. He explains to the customer and says he can have one in two days. Very good. He spends one cent on a postal card ordering from his jobber in the city, who mails it 300 miles for 7 cents. It has cost the merchant 12 cents for the tool and 8 cents postage, total 20 cents, and it retails for 30 cents, with a net profit of 10 cents or 50 per cent. Under the old regime the express charges would have absorbed all the profit, or more.

A new business, or rather the development and expansion of an old one, which will come with parcel post is the manufacture and sale of cartons, or pasteboard containers for mailing all sorts of things.

In Great Britain the parcel post is very profitable to the government, a large volume of business being done in local city delivery. Many of the smaller shops use it exclusively for delivery, as, for instance, a box of cigars bought at 1 p. m. on the Strand will be delivered at 4 to 5 p. m. 8 miles distant for about 3 cents of our money. We have nothing to compare with this at present, but in due time doubtless will. In the larger cities the parcels are not delivered by the letter carrier, but by men with pushcarts.

Building Inspectors Careless

THE collapse of two large moving-picture theaters within the past few weeks demonstrates the importance of a much more rigid inspection of buildings to be used for this purpose. Both were one-story buildings erected specially for moving-picture shows. Not that the moving picture is to blame, but the small amount of capital required to embark in the business invites many of limited means, and the temptation to build as large and cheaply as possible is ever present. Special inspection of all such theaters is essential on account of the large proportion of women, and children unaccompanied by adults, which constitute the audience a good part of the time.

The wreck in Chicago, where several hundred tons of cement roof fell, which would certainly have killed 90 per cent of the audience,

fortunately occurred just before a performance, when no one was in the building. The Cincinnati wreck, illustrated on another page, came only a few days before the "free opening," at which, had the disaster occurred, probably 1,500 must have perished. The fact that these two wrecks occurred in large cities must not relax the responsibility of officials in smaller towns, for this type of theater is springing up by hundreds all over the country, in response to a popular demand which has never before been equaled in the amusement line. Even where the structure is perfectly sound, there are hundreds of these theaters where the facilities for ventilation in case of even a small fire, or safe exit in event of causeless panic, are so inadequate that great loss of life would be inevitable. In the larger cities political pull and graft are responsible for many of these death traps, but in the smaller towns conditions are usually bad because either the inspector fails to comprehend the danger or the theater owner is his neighbor and assures him everything is all right. These theaters, by reason of their smaller size and rapid and quiet multiplication, have not received anything like the supervision they deserve, and the mayors, police and fire department chiefs and building inspectors who read this should make it their personal business to know immediately what are the actual conditions in their own city.

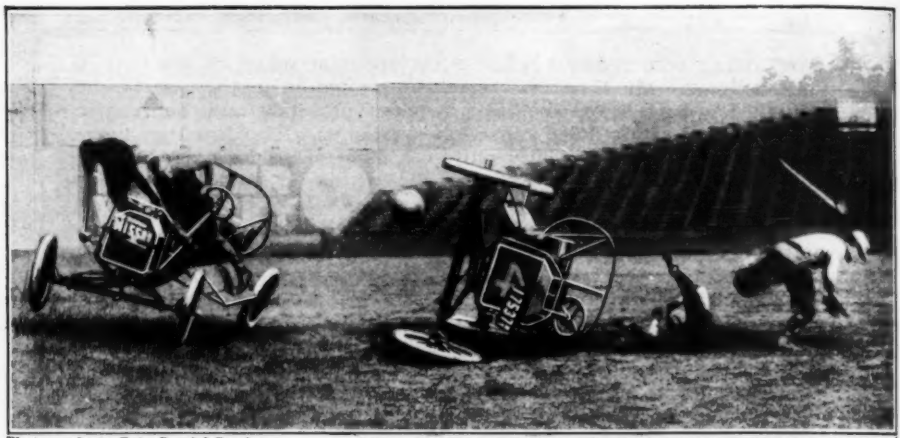
There is another effective way to secure correction of these evils, and that is for every father to investigate for himself the "movies" visited by his children and forbid their attendance on those places whose exits and fireproof construction fail to satisfy him.

WHILE on the subject of "movies," a prediction may safely be made that in the very near future provision will be made for moving pictures in the home. When a man decides to build a house to cost, say, $25,000 or more, the architect will plan the picture room in which the family and their guests can enjoy a select program of latest productions. It may be in connection with a dancing room or it can be accommodated in much less space. A projecting machine suitable for the home will not be very costly, and the films will doubtless be delivered each week by companies organized for that special purpose. Travelers returning from abroad will find pictures of cities and scenes they have visited a wonderful help in reciting to friends and relatives incidents of the places they have visited.

Films for Families

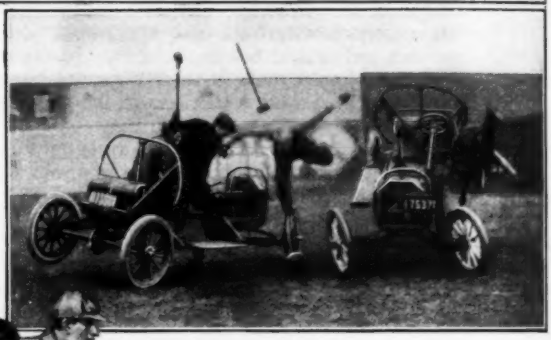
Another new industry which will soon come into existence in all the larger cities will be film photography. Children's birthdays, garden parties, weddings and other functions which in later days or years recall pleasant memories will be thus perpetuated by the film photographer. He will eventually be considered as much a necessity as the orchestra. Undoubtedly one of the most acceptable wedding presents in days to come, from parents to bride and groom, will be a set of progressive films showing the children as they advanced from infancy to high-school days. As a feature of the wedding festivities these pictures would afford both amusement and entertainment.

H. H. WINDSOR

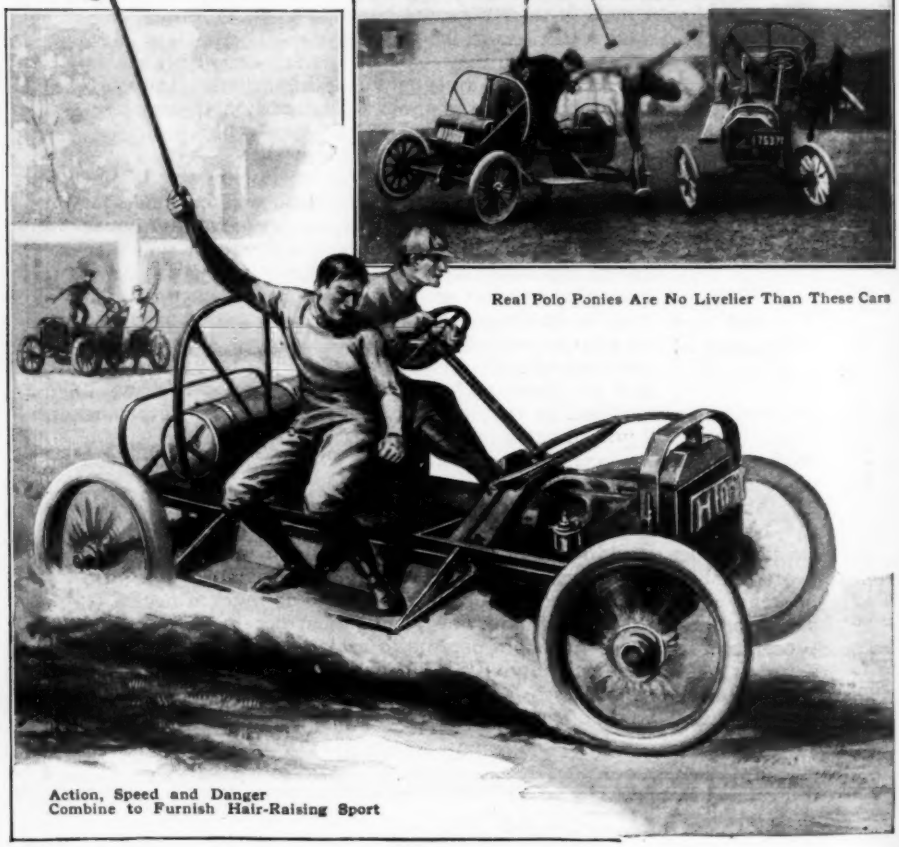


Photographs by Bain Special Service

An Exciting Spill, but Nobody Hurt



Real Polo Ponies Are No Livelier Than These Cars



Action, Speed and Danger Combine to Furnish Hair-Raising Sport

"AUTOPOLO" MOST THRILLING OF MODERN SPORTS

Unless airmen take to playing polo with a gas-filled sphere, swooping down and around each other in an endeavor to drive the ball between captive-balloon goal posts, the game of "autopolo," which has recently come out of Kansas, may retain for some time to come the reputation of being the most thrilling of modern combative sports. And it may also be fairly questioned whether the jousting tournaments of old were as exciting to the spectators as is this new game.

The game, as played by its Wichita, Kan., exponents, is divided into five periods of 10 minutes each, with an intermission of 5 minutes between each period. Each team may consist of one or two cars, but more than four cars all told, is considered suicidal. The occupants of each car are a driver and a mallet man. The machines used are racing cars, stripped almost to the bare frame, and geared in such a manner that it is almost impossible to kill the engine, even when the car capsizes, which is not an infrequent occurrence. Heavy strap-iron hoops are mounted back of the driver's seat and over the radiator on each car. Their purpose is to protect the power plant should the car turn turtle, also to keep the weight from crushing the players in case, not jumping quick enough, they should be caught underneath. It also serves as a self-righter, for once, at least, a car went clear over on this arch and right-side-up again. The mallet man crouches, with his feet braced on the right-side running board, ready to strike at the ball when the driver rushes the car into action. The steering wheel and controls are on the left side of the cars. The game is scored like ordinary horse polo, the effort of each team being to drive the reinforced leather ball, larger than the regular wooden polo ball, between the goal posts of the opposing side.

The description of a practice game at the American League baseball park in New York, written for Harper's Weekly by William Inglis, gives an interesting picture of the new sport: "The machines dashed to and fro over the green turf in astounding bursts of speed, their erratic, zigzag flight accompanied by rattling volleys of barks, snaps, and explosions. The machines had no mufflers, and each bark and snap was accompanied by jets and bursts of flame. The skeleton steel cars darted here and there with the venomous haste of hornets seeking a victim. . . . The cars dived after the ball, spun dizzily around in their own length to follow it, leaped incredible distances, stopped, jumped backward, lunged forward again, locked wheels, bumped each other, flew apart and came together again over the ball."

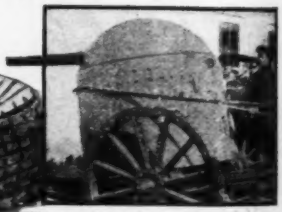
AIRMEN AND ENGINEERS PLAY IMPORTANT ROLES

Replacing a Railroad Bridge Destroyed by Turkish Troops

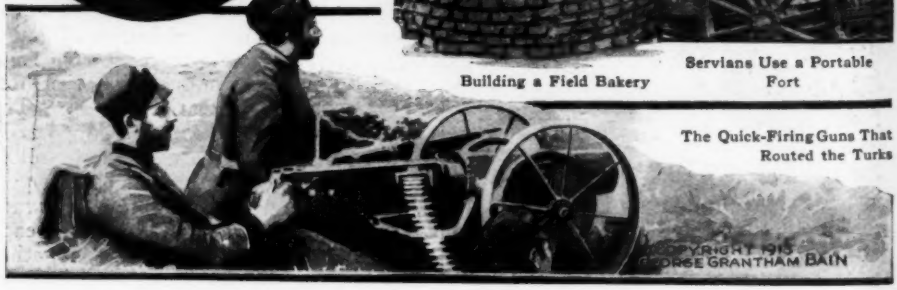
Turkish Field Guns Captured by the Allied Forces

A Novel Bulgarian Siege Gun

Building a Field Bakery

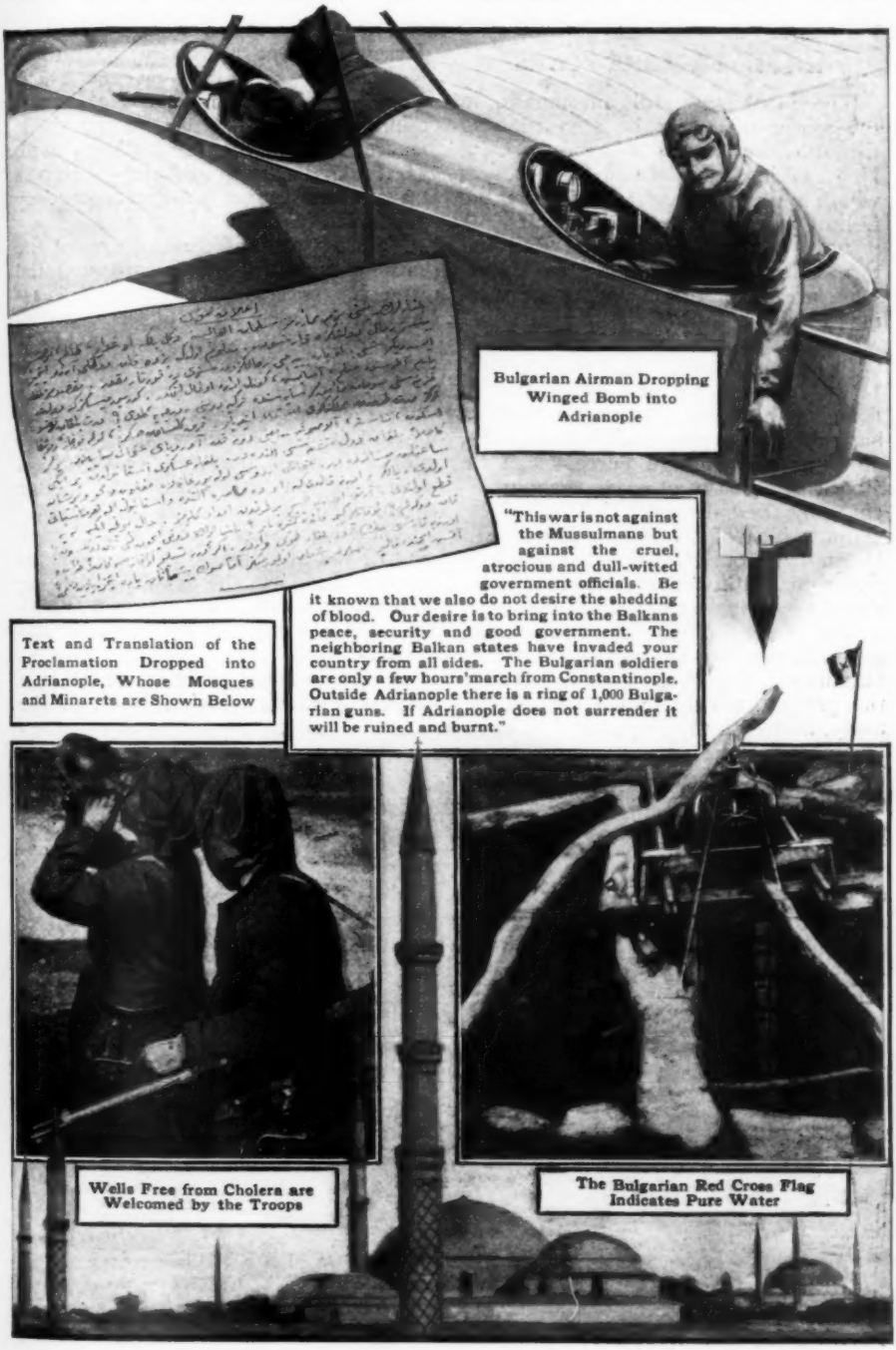


Servians Use a Portable Fort



The Quick-Firing Guns That Routed the Turks

IN THE BALKAN WAR AGAINST TURKISH RULE



Bulgarian Airman Dropping Winged Bomb into Adrianople

Text and Translation of the Proclamation Dropped into Adrianople, Whose Mosques and Minarets are Shown Below

"This war is not against the Mussulmans but against the cruel, atrocious and dull-witted government officials. Be it known that we also do not desire the shedding of blood. Our desire is to bring into the Balkans peace, security and good government. The neighboring Balkan states have invaded your country from all sides. The Bulgarian soldiers are only a few hours' march from Constantinople. Outside Adrianople there is a ring of 1,000 Bulgarian guns. If Adrianople does not surrender it will be ruined and burnt."

Wells Free from Cholera are Welcomed by the Troops

The Bulgarian Red Cross Flag Indicates Pure Water

POWERFUL AUTOMOBILE TO HAUL FREIGHT CARS

The most powerful automobile in the world will soon be seen running through the streets of Jersey City, N. J., taking the place of eight horses which pull the freight cars from the freight yards to the factory spurs. It is now at the Pennsylvania Railroad terminal in that city where two chauffeurs are being trained in its management.

The automobile weighs 28,850 lb., is 22 ft. in length and 8 ft. 6 in. in width. It is operated by electricity and is fitted with 80 of the largest storage batteries made. Its speed is eight miles an hour and enough current can be stored to carry it 40 miles without recharging the batteries.

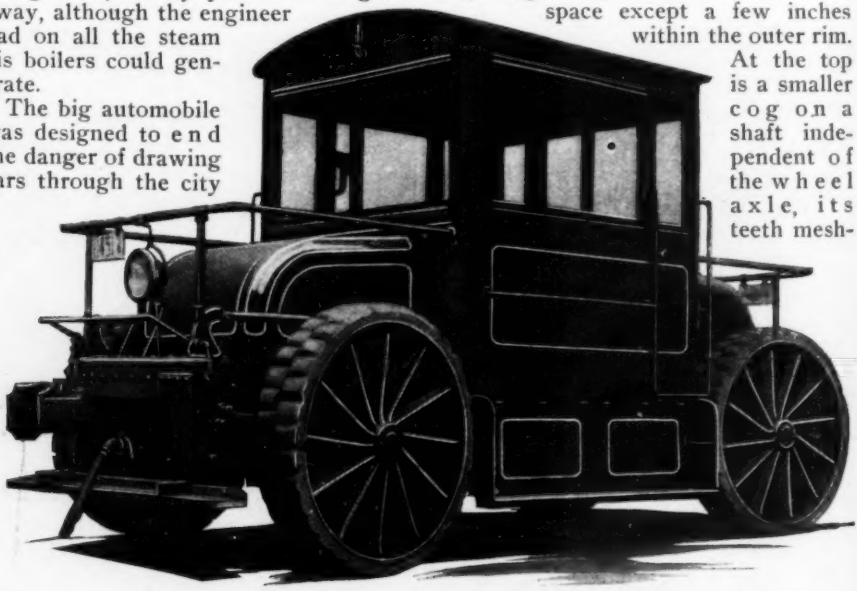
Some idea of its pulling power can be gained from the fact that when it was first put together at the Altoona shops it was tested in a tug of war with a "hog" freight engine, one of the most powerful types of locomotive. The big automobile, the wheels of which ran on the ground, slowly pulled the engine away, although the engineer had on all the steam his boilers could generate.

The big automobile was designed to end the danger of drawing cars through the city streets by horsepower, as is done in Jersey City, or by steam, as on the New York Central's west-side tracks along New York's streets. Deaths and minor accidents have been unavoidable where these methods have been used, as it has been impossible to stop a train of cars suddenly when emergency demanded it.

This big auto promises to make the hauling of railroad trains through the streets safer than the running of pleasure automobiles, as, while it is impossible to stop an ordinary auto going at a moderate speed in less than 10 or 15 ft., it is stated by the railroad officials that the tractor, with a train of cars behind it, can be brought to a dead stop within 2 ft. by means of air brakes operating on the cars and tractor simultaneously.

A device in the drawheads at each end of the auto takes up the shock of sudden stoppage, the drawbar working in compressed air. It requires a 10,000-lb. pull to bring the metal parts into contact.

In the interior of each wheel is a large cogwheel, which fills all of the space except a few inches within the outer rim. At the top is a smaller cog on a shaft independent of the wheel axle, its teeth mesh-



This Automobile, Which Out-Pulled a Powerful Freight Locomotive, is for Hauling Trains through City Streets

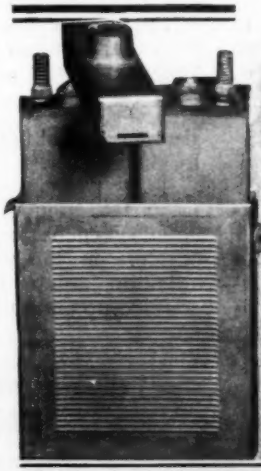
ing with the larger cog. Each wheel is driven independently of the other three and each is steered and braked separately, but the motions are simultaneous. The inventor claims that but one-half second is lost in braking, from the touch of the brake handle to the time the machine and all the load it is drawing is motionless. If the chauffeur is facing an emergency, he may keep his hand on the steering wheel and by leaning his body against the air switch can instantly apply the brake. The air appliance not only puts on the brake, but it also stops all the power in the machine and locks the power levers, which no accident can set in motion again until the air brake is thrown off. In this respect this machine is different from steam engines or automobiles, as on those machines the operator must not only apply the brakes, but must shut off the power.

EDISON HONORED FOR HIS MINERS' SAFETY LAMP

The development by Thomas A. Edison of a practical electric safety lamp for miners and for workers in tunnels, in factories where explosives are made, and where explosive gases are generated or in use, has brought this inventor the Rathenau medal, which is the greatest honor at the disposal of the American Museum of Safety.

The Rathenau medal is well known in the European scientific world. It was presented to Dr. Emil Rathenau, president and founder of the Allgemeine Electricitäts Gesellschaft of Berlin, on the occasion of his 70th birthday, with the felicitations of the Kaiser. Rathenau is the man who introduced electric lighting into Germany. Last summer the medal was placed at the disposal of the American Museum of Safety to be awarded annually for the best device or process in the electrical industry for safeguarding industrial life. One medal is to be struck each year from the original die for the museum to award.

Much is claimed for the practicability of the Edison safety-lamp outfit, and



The Battery Comprises Two Cells Carried in a Metal Case

Miner Equipped with the Electric Safety Lamp, Showing Battery Strapped to His Waist at the Back, and the Flexible Armor for the Protection of the Wiring

the American Museum of Safety, in bestowing its highest honor upon the inventor, apparently finds these claims justified. Among these claims are: that it is impossible for the miner to cause a spark by disconnecting his wire in the mine; that there can be no insulation troubles, seeing that the cells are placed together without any insulation whatever; that the only attention necessary consists of charging, replenishing the electrolyte with distilled water to make up for decomposition when overcharged, and keeping the exterior cleaned; that there is no sediment to be cleaned out, and no renewing of plates or separators; that there is no possibility of the batteries leaking; that the gases given off when the batteries are charged do not carry with them any substance to corrode the steel parts used in the construction of the lamp or carrying case; that there is no injury to the cells when overcharged for a short or prolonged period, and that the steel container is proof against rough handling.

The method of carrying the outfit is clearly shown in one of the illustrations, the battery case being attached by a belt to the miner's back. The cord, which is incased by a flexible armor for a great part of its length, to serve as an anchor and to prevent sharp bending, passes through a guide in the back of the cap to the lamp. Similar flexible armor surrounds the cord at the lamp connection. The lamp is a tungsten, contained in a parabolic reflector provided with a flange, which supports a thick glass lens cushioned on gaskets. It is impossible for the miner to get into the reflector to tamper with the lamp unless he breaks a seal on the flange. The twin conductor flexible cord is provided with a terminal, which, when shoved into the socket or top of the battery case, becomes fastened in such manner as to make disconnection impossible until the lock on the side of the case is removed and the lock bar in the top withdrawn from the eye on the terminal.

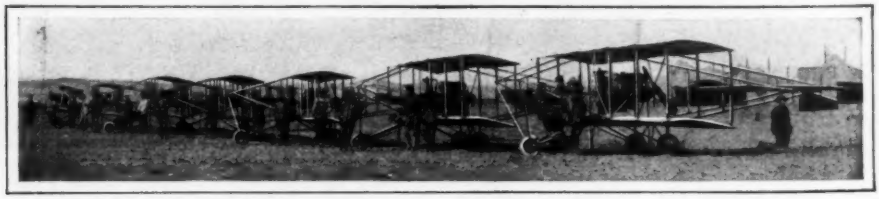
The battery comprises two cells. The positive pole of one cell is grounded to its can, and the negative pole of the other to its can, the two cans being connected. The terminals of this two-cell battery are provided with coiled-spring contacts, which connect with nickel-steel contact plates affixed to the top of the carrying case. There is no insulation between the cells, nor between the cells and carrying case, which secures the battery snugly when the hinged top is pushed down and padlocked in place.

The mine electrician hands the outfit to the miner fully charged and "burning," with case padlocked.

A CORPS OF UNITED STATES ARMY FLIERS

This interesting illustration shows the extent of activities in the army aerial camp on North Island, San Diego, Cal. The seven Curtiss biplanes, used by the army airmen in studying aerial navigation, are lined up for inspection.

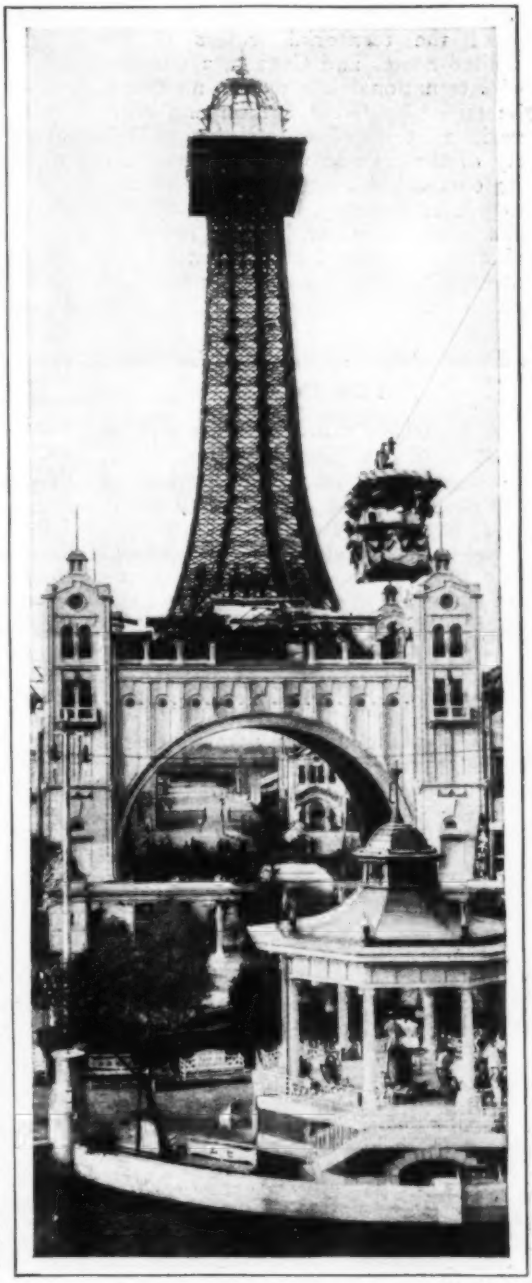
¶Charles Nieuport, one of the most noted French airmen and monoplane builders in the world, was instantly killed on January 24 when his machine doubled up and fell to earth.



Seven Curtiss Aeroplanes Lined Up for Inspection at the Army Camp on North Island, San Diego

A "WHITE CITY" IN JAPAN

That the modern Japanese amusement parks do not differ materially from the "White Cities," "Coney Islands," and the like, in this country has visual confirmation in this illustration, which shows an amusement place in Osaka. In the foreground, extending out over a little lake, is a band stand. The big arch and tower is called the "tsutenkaku" (heaven - reaching tower). One of the cars of an aerial trolley may also be seen.



A Modern Japanese Amusement Park that Might Be in Chicago or London so Far as Appearance is Concerned

TO CHANGE CLIMATE WITH GULF STREAM

An amazing plan for changing the entire climate of the Atlantic Coast of North America, by deflecting the great heat-bearing Gulf Stream from its course and sending it more directly into the arctic region, has been suggested by an engineer of New York. The plan involves the building of a wall, 200 miles in length, eastward from the coast of Newfoundland, which structure would turn the cold Labrador current eastward until it encountered the north-bound Gulf Stream in deep water. By this process it is claimed that the larger portion of the cold stream would flow under the warm current and the ice-laden upper part would be turned northward again instead of continuing south. It is further suggested that a wall extending from Cape Race into the ocean a distance of 30 miles would modify the climate from Newfoundland to Cape Hatteras, and cause milder winters and earlier springs in the northern sections of the United States. In either

case, as the wall would extend far beyond the territorial waters of the United States and Canada, a question of international law would, no doubt, be raised by Great Britain and other nations interested, even if the possibility of the scheme were admitted and its cost could be estimated with any degree of accuracy. The originator of the plan, however, thinks that the shorter wall could be constructed for about $190,000,000, or far less than the cost of the Panama Canal.

SIX-MILLION-DOLLAR BRIDGE FOR INDIA

A $6,000,000 railroad bridge will be built across the lower Ganges River, India, with 15 spans, each of which is 359 ft. long. The spans weigh about 1,300 tons each and will support two broad-gauge tracks and a footwalk. The foundations for the main spans are sunk 150 ft. beneath the bed of the river.

MAROONED ON ROOF: GETS HELP IN NOVEL WAY

An artist who went to the roof of a hotel on Broadway, New York, to make a sketch of a new building, found, when he attempted to leave, that the roof door had been locked. When darkness approached he leaned over the cornice and called to the throngs in the street to get assistance. He made some of the passers-by hear, but those who heard thought he was shouting at those who didn't and paid no attention. At last he started running around the water tank to keep warm, and the idea occurred to him that if he shut off the water some one might come up to ascertain what the trouble was. They did, in about 10 or 15 minutes.

¶It is possible to build a railway across the Sahara Desert, according to the report of engineers sent out by the French government to make an examination of this arid tract of land.

TOURING 27,000 MILES WITH ONE AUTO

Considerable ingenuity was often required to overcome bad roads in an automobile tour of 27,000 miles recently made by B. O. Tilden of New York. Near Colmar, N. M., the machine struck a treacherous roadbed of soft

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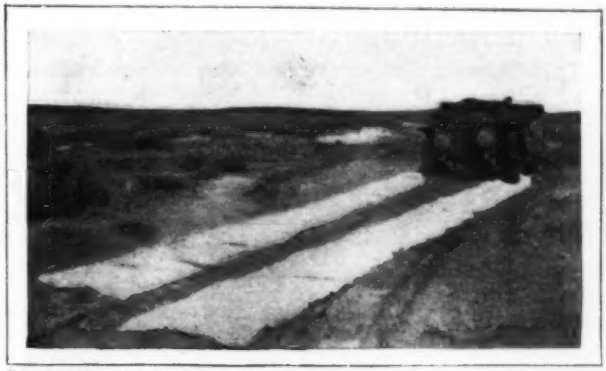
Crossing an Arroya or Dry River Bed near Rice, Arizona

adobe mud and promptly sank to its axles. In order to extricate the vehicle the tourists were compelled to build a corduroy road by cutting off the tops of a ranchman's fence posts for half a mile. These, together with jacks, raised the car out of the mud, and, with the aid of canvas strips laid parallel, the party was able to travel the next five miles in about eight hours. A road near Fargo, N. D., also presented an almost impassable condition and the travelers were frequently forced to make a passage for the machine with shovel, jack, canvas and boards. In crossing an arroya or dry river bed within a few miles of Rice, Ariz., the vehicle was put to a most severe test when it was driven over the uneven surface of thousands of boulders, both large and small, which literally covered the bed of the stream. The trail of the party covered the southern states as far south as Chattanooga. When San Francisco was reached the tourists embarked with their automobile for Honolulu. Upon their return to San Francisco, they traveled up the Pacific Coast as far as Vancouver and then returned home by way of Chicago and the Great Lakes. The strenuous trip was made with a 58-hp. car, equipped with extra leaves in the springs, a 30-gal. gas tank and special tires.



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Using Strips of Canvas to Prevent Auto Wheels from Sinking

Copyrighted by American Sanitary Works
A Typical Mud Road

DIRIGIBLE DISCOVERS OLD AMERICAN WAR VESSEL

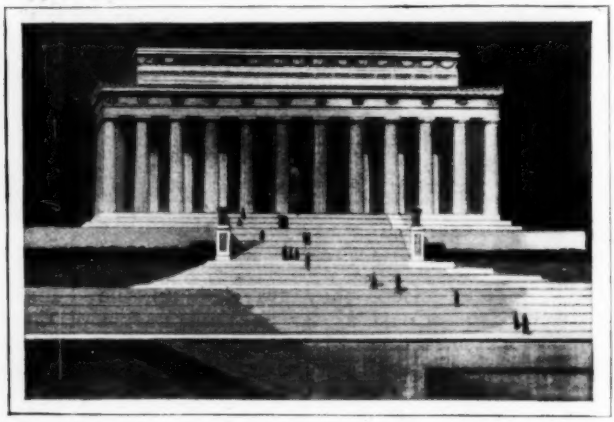
The wreck of the famous American frigate "Philadelphia," which was decoyed within the reefs of the harbor of Tripoli and sunk during the war with Tripoli in 1804, has, according to dispatches from Rome, been discovered by an Italian dirigible which was flying over the harbor. The finding of the old wreck excited considerable interest, and Richard D. White, American naval attaché at Rome, was sent to investigate the matter of raising the hulk and securing the cannon and other relics aboard.

The discovery of the wreck by a dirigible is an interesting demonstration of the fact that an observer, flying over water, can see to a great depth.

¶The government issued by mistake in 1890 a sheet of $50 bank notes, the reverse side of which bore the imprint of $100 bills. The misprint occurred in reversing the sheet during its printing. A few of the bills are still out.

THE LINCOLN MEMORIAL FOR THE NATION'S CAPITAL

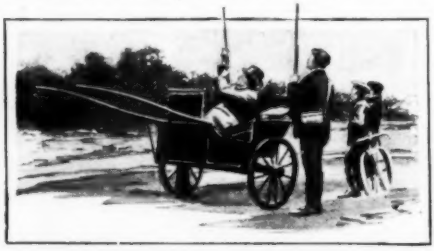
This reproduction of the architect's drawing shows the memorial to Abraham Lincoln which is to be erected in Potomac Park, in Washington. The structure will be of white marble, and will have a magnificent statue of Lincoln in the interior.



The Memorial to Abraham Lincoln Designed for Washington, D. C.

WOUNDED SOLDIER SHOOTS FROM PONY CART

Captain Kirby, formerly of the British army, does his game shooting from a small pony cart. While serving in the South African war, he was shot through the spine in an engagement and as a consequence lost the use of his lower limbs, but being an ardent hunter, he now uses the vehicle to enable him to participate in the sport.



Injured Officer of the British Army Shooting from a Small Pony Cart

NOSE MORE SENSITIVE THAN THE SPECTROSCOPE

Science has contrived so many wonderful instruments for reaching out into the far places of the universe and telling us what exists there, detecting, recording and even weighing inconceivably small quantities of matter, that it is interesting to figure out just how our senses stand in relation to such instruments as concerns sensitiveness. The photographic plate, for instance, can see farther through a telescope than the human eye; that is, it can pick out and record stars that the human eye cannot discern.

The sense of smell surpasses in sensitiveness the finest scientific instruments. The spectroscope, for instance, can detect a quantity of the rare gas known as helium, weighing no more than three one-hundred-millionths of a grain, while the human organ of smell is normally capable of distinctly perceiving the odor of a 300 times smaller quantity of sulphureted hydrogen, which is the exceptionally disagreeable gas developed in decaying eggs.

LARGEST IRON-ORE DOCK IN THE WORLD

The largest iron-ore dock in the world is to be constructed at Oneita, Minn., and will probably be completed during 1914. This immense structure of steel and concrete will be 2,300 ft. long, 56 ft. wide, 80 ft. above the water level, and will cost about $2,750,000. The only wood to be used besides the piling is the maple flooring of the storage pockets. The new dock will have 384 ore pockets, each of 300 tons capacity, or a total storage capacity of 115,200 tons.

FOURTEEN-INCH GUN EXPLODES

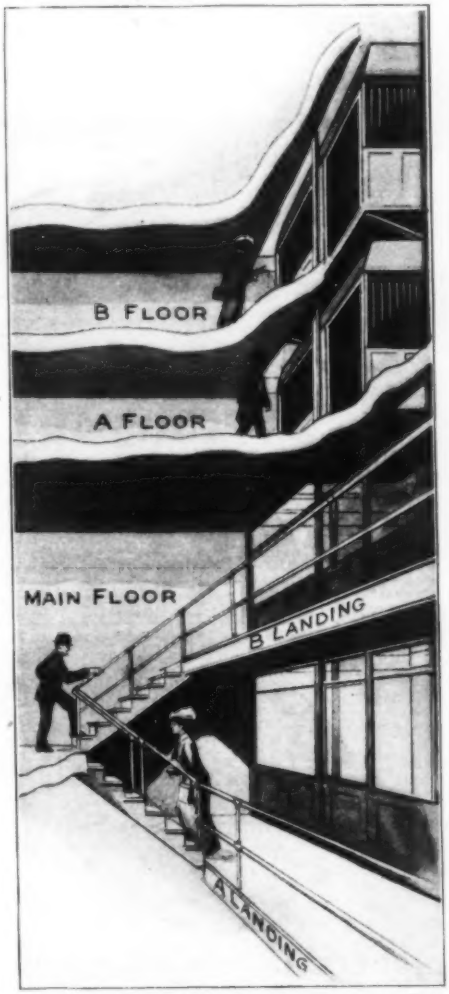
One of the 14-in. guns of the type proposed for the fortification of the Panama Canal exploded recently during tests at the Sandy Hook proving grounds. The gun weighed 50 tons and cost $130,000. The force of the explosion threw the two-ton breech block a quarter of a mile, the muzzle was hurled still farther away, ripping up a section of railroad track, and fragments were blown in every direction. Major Brennan, ordnance officer, who was standing on the disappearing carriage, was thrown many yards, but sustained hardly a bruise. The other officers and the men were behind a bomb-proof wall which protected them.

TWO-STORY ELEVATOR FOR SKYSCRAPER

A two-story elevator that increases the efficiency of elevator service while decreasing the amount of space required for shafts is the latest improvement in skyscraper equipment. Two cages are rigidly connected together, with floors the same distance apart as the floors of the upper stories of the building. The cages stop, therefore, level with any two adjacent floors. Starting and stopping is controlled by an operator in the lower or "A" cage. An automatic locking device renders it impossible for the operator to start the cars, after they have been stopped in any position, until an attendant in the upper or "B" cage has released the mechanism, when a signal is automatically given the operator.

At the main floor, the cages load at "A" and "B" landings, each of which is reached by a short flight of stairs. Above the main floor, "A" and "B" floors alternate. On the directory board each office number has the prefix "A" or "B," while conspicuous signs direct visitors to the proper landings.

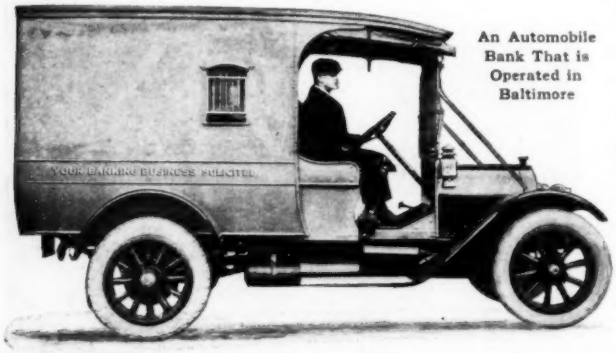
An up-to-date elevator travels from one floor to the next in 1½ seconds, while a stop requires from four to six seconds. Owing to the decrease in the number of stops and the consequent shortening of the time required for a round trip, the two-story elevator has a capacity 2.4 times greater than the single car. It is estimated that 13 minutes and 21 seconds would be required for emptying the Singer tower in New York City in case of fire or panic. With two-story cars operating in the same shafts, this time would be reduced to 5 minutes and 34 seconds.



Two-Story Elevator for Skyscraper, Ready to Take on Passengers at A and B Floors

BALTIMORE HAS AN AUTOMOBILE BANK

One of the banking institutions of Baltimore is now operating an automobile bank which travels to customers who find it impracticable to leave their business or homes during banking hours. That the idea is a good business venture was demonstrated in the first two or three weeks of operation, as several good accounts that otherwise could not be handled were obtained.



An Automobile Bank That is Operated in Baltimore

The banking compartment of the automobile, 7½ ft. in length, with a 6-ft. head room, provides ample space for a safe, wooden counter, the necessary drawers and a desk. A revolving desk chair is securely fastened to the floor of the car in such position that the teller can turn around from his desk to receive deposits or pay out money through the grilled pay windows.

SHOE CLEANER DRAWS CROWD TO WINDOW DISPLAY

The management of a cleaning establishment in Peoria, Ill., has found a unique way of inducing people to look at the display in the show windows. On the sidewalk beneath the windows is mounted a motor-driven shoe cleaner, which is in use almost continuously, many people leaving the main business street, a block away, to have their shoes dusted by the machine.

ROOF GARDENS FOR NEW YORK'S FIRE HOUSES

Fifteen of the new fire stations in New York are to be provided with roof gardens of two types for the enjoyment of the men. One type is a covered garden, 20 ft. deep, across the front of the three-story fire house, on a level with the top floor and opening directly into the recreation rooms, while the other is an uncovered garden, also on a level with the third floor, across the rear of the house, access being through glass doors opening from the recreation rooms. Though the central space of these gardens must be left clear for recreation, the firemen will be allowed to grow plants and shrubs around the sides.

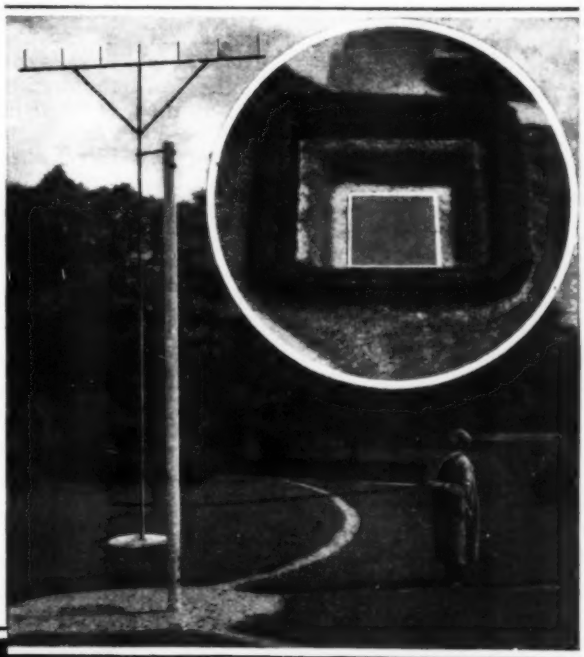
OBSERVATION AND MEASUREMENT OF THE CLOUDS

In the accompanying illustrations are shown a number of instruments used in scientific observation of the clouds, which, as now carried on, has become an important and fascinating study, particularly as the formation, or, at least, the motion of the clouds, indicates also that of the air in which they are floating.

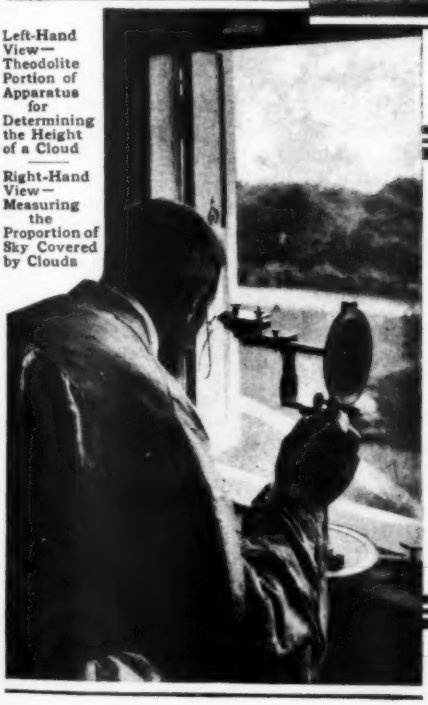
One of the instruments, an adapted theodolite—the surveyor's angle-measuring device—is used to determine the height of a cloud. The theodolite has its telescope removed, and in the place of this are arranged two parallel plates of glass. The instrument is mounted in an open window and on the ground below is provided a small sheet of water, as shown in one of the other illustrations. The two images of the cloud, one formed by reflection in the glass plates and the other in the water, are made to coincide by rotating the plates of glass. The position of the

plates so determined is read off on the graduated disk shown near the observer's hand, and the height of the cloud can then be computed mathematically.

The motion of a cloud may be measured by means of an instrument called a "nephoscope," which consists of a revolvable rod having a cross-piece resembling an inverted harrow or comb, mounted as shown. The observer stands on the side of the post opposite to that of the cloud and rotates the rod until it is in such position that the cloud appears to pass along the points. It is necessary for the observer to approach or recede



Above—Sheet of Water Used with Theodolite
Below—Measuring Cloud Movement



Left-Hand View—Theodolite Portion of Apparatus for Determining the Height of a Cloud

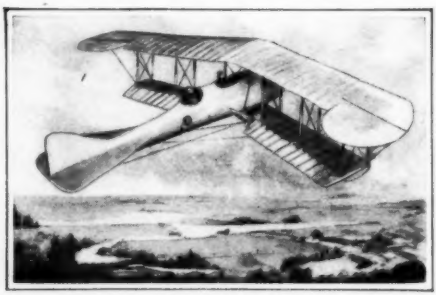
Right-Hand View—Measuring the Proportion of Sky Covered by Clouds

from the post until this appears to take place, then he stands still and notes the time it takes the cloud to move from one point to the next. The graduated disk at the bottom of the rod gives him the speed.

The proportion of sky covered by clouds may be measured by means of a convex mirror arranged to form images of different parts of the sky as required. This instrument, giving a reduced image of the sky, makes possible a more accurate estimate than direct observation.

ARROWLIKE WINGS ON NEW BIPLANE

The biplane, "The Arrow," is considered the latest development in German aeroplane construction. The

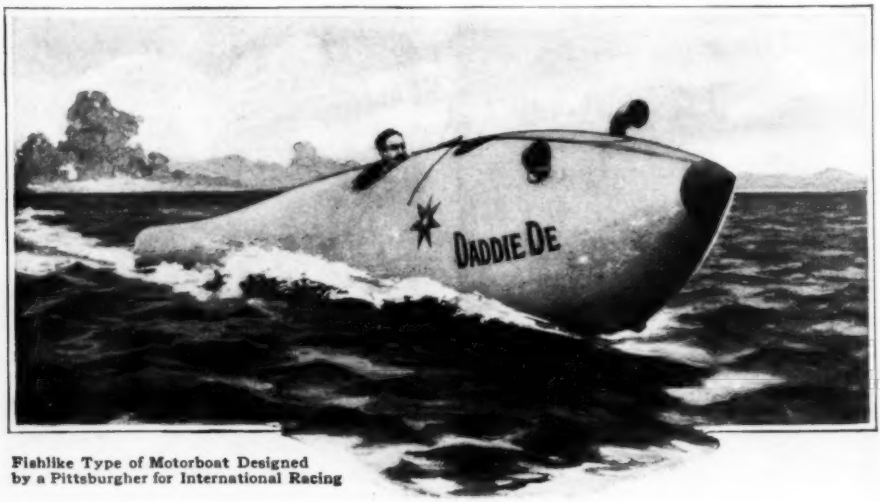


The Blunt Arrowhead Shape of the Wings Gives This New Biplane the Name of "The Arrow"

main planes are given the shape of a blunt or wide-angled arrowhead, from which feature it takes its name. It is equipped with a 120-hp. motor, weighs 1,540 lb. and has an average speed of 65 miles an hour. Built with exceptional solidity and said to have remarkable inherent stability, it has made many successful flights in unfavorable weather, and is recommended by army experts for adoption as a military type. The apparatus can be taken apart for transport in 15 minutes.

ODD TYPE OF MOTORBOAT FOR RACING

The peculiar motorboat here shown, and which was intended as an international cup defender, is 31 ft. long, 4 ft. in diameter at the widest part, and 2 ft. at the rear end. The framework of the craft, which is cylindrical in shape, is composed of a series of hoops ranging from 2 ft. to 4 ft. in diameter. The tapered or fishlike form of the body was expected, under high speed, to cause beneath the boat a vacuum into which the water would rush and materially assist in propelling the

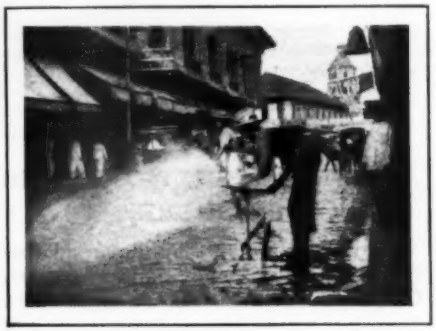


Fishlike Type of Motorboat Designed by a Pittsburgher for International Racing

craft. The rudder consists of two long brass plates, shaped like fish fins, and placed on each side about 8 ft. forward of the stern. The motive power was supplied by a 30-hp. engine connected to a two-bladed propeller whose blades were of clawlike construction. The steering gear was formed of a bicycle wheel, to the rim of which were fastened the rudder cords after the tire had been removed. The mechanism of the boat has since been altered, as it failed to develop the expected speed of 60 miles an hour.

WASHING THE STREETS IN MANILA

The streets in Manila are washed down every afternoon, fire hose being



Manila Street Washing Lessens Disease as Well as Subdues Heat

used by the street department for this purpose. The health officers in the Philippines have made an enviable record, and liberal use of water in cleaning the streets has been one of the important factors, as this aids materially in lessening disease, and substantially tempers the heat.

DISPLAYING THE SPEED ON THE FRONT OF THE CAR

A speedometer that shows the speed in big figures above the radiator of the automobile, where all may see, as well as on the reverse side for the benefit of the chauffeur and other occupants of the car, has made its appearance. In London it is being particularly

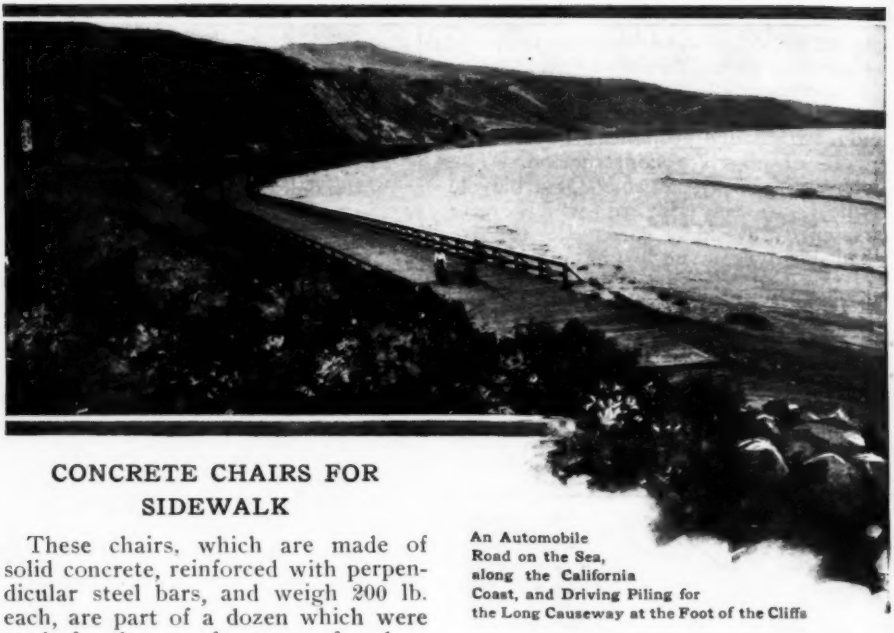
Big Figures on the Front of the Car Show the Speed

urged for taxicabs and motor busses. A gong, which is set ringing when the speed limit is exceeded, is also provided. If the driver ignores the gong, a red "danger" signal is displayed. It is not likely that such a device will find favor with automobile owners.

A LION-PIANO COMBINATION

New and "striking" means have to be resorted to by the animal tamer, when appearing in vaudeville theaters, to hold the interest of a public which has become more or less tired of "animals." An example is here shown in a woman lion tamer, who plays a piano while her favorite pet rests upon the piano's top.

Courtesy The Sketch, London
An Attentive If Not Particularly Musical Listener



An Automobile Road on the Sea, along the California Coast, and Driving Piling for the Long Causeway at the Foot of the Cliffs

CONCRETE CHAIRS FOR SIDEWALK

These chairs, which are made of solid concrete, reinforced with perpendicular steel bars, and weigh 200 lb. each, are part of a dozen which were made for the use of patrons of a pharmacy on one of Chicago's busiest thoroughfares. The chairs, each of which has fastened to its back a box in which are planted flowers and vines, were purposely made heavy, to prevent removal by mischievous boys on Halloween and similar occasions.

Courtesy Concrete-Cement Age

Concrete Chairs That Weigh over 200 Pounds Each

AUTO ROAD BUILT OVER THE SEASHORE

The Rincon automobile road between Ventura and Santa Barbara, Cal., includes a series of causeways, stretches of highway built on piling over the seashore, the longest of which is 4,400 ft. long, while there are three others ranging in length from 400 ft. up. They are all constructed upon substantial piling of eucalyptus, a teredo-proof wood, and are 20 ft. wide, floored with planks and stoutly railed on both sides. The floor will eventually be covered with some paving material to protect the planks from wear.

This road will shorten the distance between Ventura and Santa Barbara by nine miles, eliminate the need of traveling by the Casitas Pass, a dangerous and sometimes impassable mountain road, and add a great many miles to the motor highway along the Pacific Ocean. The run from Los Angeles, through Ventura, to Santa Barbara is one of the finest one-day

automobile trips on the coast, having for its terminus the best preserved and most beautiful of the ancient missions, the only one that is still occupied by the Franciscan Fathers.

The funds for this new highway, which was opened for the public a few weeks ago, was raised by motorists, $36,000 being subscribed, and the State Highway Commission contributing an additional $10,000. A total of 6,800 ft. of causeway was built, a temporary bridge constructed over the Ventura River, and contracts have already been let for a permanent steel and concrete bridge to replace it. The dirt road that links up the causeways will later be paved with macadam and oil.

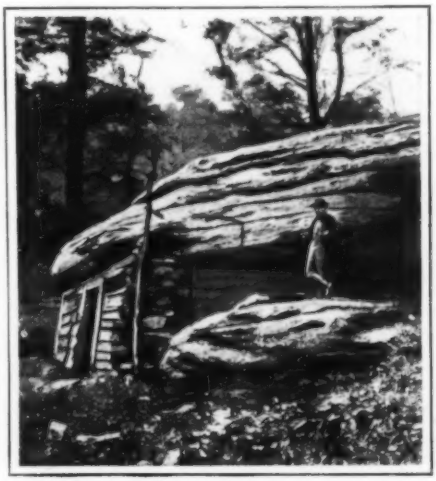
This highway is one of the earliest used in the history of the state, although it fell into disuse. In the days of the Padres, the beach was the only convenient road between the missions, though it was available only at low tide; while, in later days, the stagecoaches were often seen floundering through the breakers. The cliffs rise so abruptly from the sea along this stretch that the railroad builders had to blast out miles of right of way, and the new causeways are built over the narrow strip of sand between the ocean and the railroad tracks.

WHY TREES WERE LEFT IN GATUN LAKE

The trees which occupy the area of 164 square miles that was selected for the site of Gatun Lake at Panama were left standing because it would have required an expenditure of about $2,000,000 to clear this large space. As a tree smothers when its roots are covered with water for some time, thousands of the trees in the lake already are beginning to die and it is probable that all of them will have decayed and floated downstream within a few years.

ROCK USED AS A HOME IN BLUE RIDGE MOUNTAINS

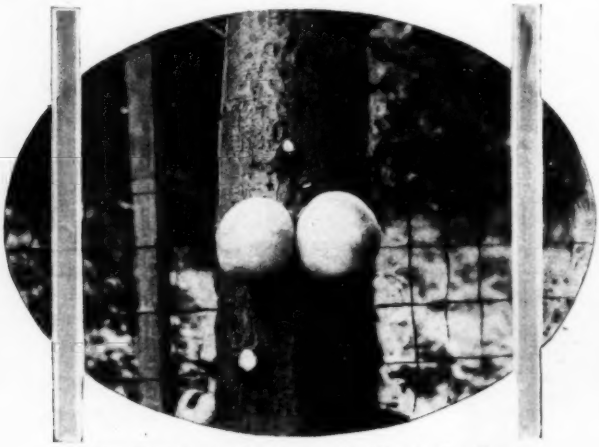
A hunter and his family in the Blue Ridge Mountains have fashioned what they consider an excellent home for winter shelter out of a rock formation rising, weathered and worn, above the ground among the trees. The entrance is shown at the left.



The Rock Shelter of a Hunter in the Blue Ridge Mountains

APPLES GROW OUT OF TREE TRUNK

The apples shown growing out of the trunk of an old apple tree in the accompanying illustration look as though they had been hung there, but the contributor says that they actually grew in this manner on a tree in an orchard at Hampton, Iowa. The lowest limbs of the tree are 4 or 5 ft. above the apples.



Two Fine Apples Growing on the Trunk of a Tree

¶Brazil produced 1,322,720,000 lb. of coffee during 1912.

BALLOONS TARGETS FOR NEW KRUPP GUN

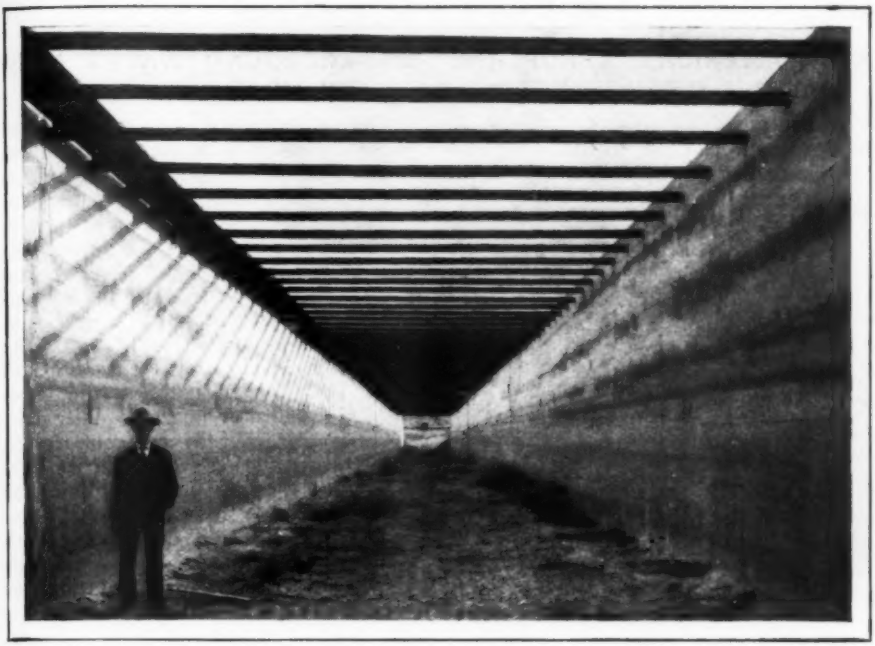
The Italian government has just concluded a successful test of a gun designed by the Krupps to be used against airships. The projectile used in the gun is so constructed that it sets the airship on fire. There were several kinds of tests made, fire being directed at balloons going through the air at the rate of 13.8 miles an hour, and with rising balloons. In two instances where the rising tests took place, the balloons were immediately set on fire by shots from the gun. The new weapon, which has not been officially described, appears to be something like the gun that has been designed for use in the United States military service. It has a caliber of 7 centimeters (2¾ in.) and with an elevation of 75 deg., its range is said to be about 4⅓ miles. The course of the projectile can be followed by a slight smoky trail which enables the gunners to readjust their sights in case of bad aim.

CARRYING BIG RIVERS ACROSS RIVERS

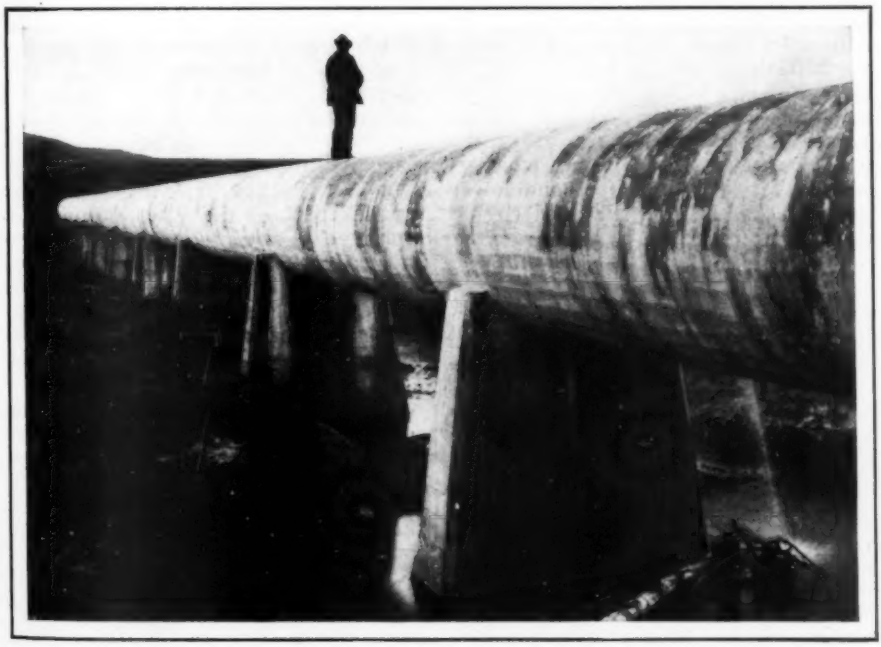
The United States is builder of some of the concrete-construction wonders of the world. The greatest of all flumes ever built is the one that crosses the Pecos River in the Carlsbad irrigation project in New Mexico. The flume acts as a canal, furnishing water to 60,000 acres of desert land. This piece of concrete construction is 35 ft. wide and carries a depth of water sufficient to float a medium-sized ocean liner having a 20-ft. draft.

Another interesting piece of irrigation construction is the reinforced-concrete pressure pipe across Sims River on the Ford Shaw distributing system of the Sun River project in Montana. This pipe is over 500 ft. long and about 8 ft. in diameter.

¶The average gain in the weight and height of children attending school in "fresh-air" rooms is 3.18 lb. during one school year, as compared with 2.69 lb. in the closed room, according to tests made by a medical inspector of Brookline, Mass.



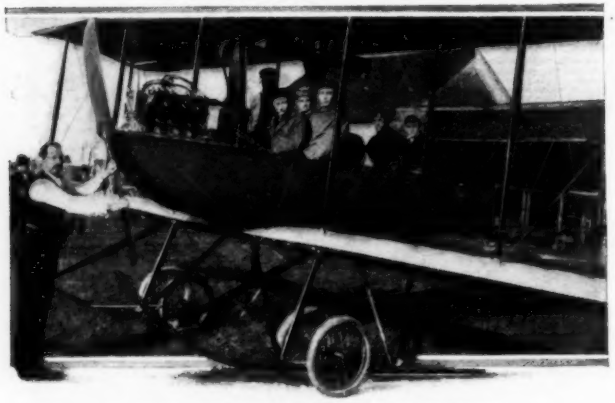
Flume Big Enough to Float Large Vessel, Built across Pecos River to Carry Irrigation Stream



Concrete Pipe over Sims Creek, Montana, Which Carries under Pressure Part of the Sun River Irrigation Waters

NEW AMERICAN AEROPLANE CARRIES SIX PASSENGERS

European airmen, particularly those of France, were obsessed not long ago with a mania for carrying a large number of passengers, as many as 13 being carried at once, in one instance. Nearly all of these, however, were boys, and many of them very small boys. The American record for passenger carrying is claimed by the inventor of the biplane shown in this illustration. This machine, which was constructed at Joliet, Ill., has carried six full-grown passengers in its boatlike car, which is located between the upper and lower planes, with the propeller and engine at its forward end.



An American Biplane That has Carried Six Persons

MOTION-PICTURE THEATERS AID CRIMINAL CAPTURE

Motion-picture theaters now play a part in the catching of criminals in Bohemia. When a criminal of importance is "wanted" by the police authorities of Prague and difficulty is experienced in finding him, a photograph is sent to every motion-picture theater in the country, and this is shown, with a short explanatory note, until the criminal is found or the order for the display of the photograph is withdrawn.

UNDERGROUND WATER USED BY MOST AMERICANS

The importance of underground waters is illustrated by the fact that 75 per cent of the people of Michigan are directly dependent for water upon the underground supply. Another investigation made by the governments of 19 counties in north-central Indiana indicates the vital relation that ground water bears to daily life. Of 54 communities in these 19 counties having public supplies, 45 use wells only, and three others use both streams and wells. The urban population is therefore largely dependent upon the subsurface supplies, and the rural population depends almost entirely upon them.

It is estimated that in Florida 750,000,000 gal. of ground waters are used daily for town and country domestic supplies, while 11,500,000 gal. more are used by the cities and 500,000,000 gal. for the irrigation of tobacco, citrus fruits and vegetables. One-half of the irrigation and the greater part of the city supplies in southern California, amounting to more than 300,000,000 gal. daily, are drawn from the sands and gravels that underlie the valleys, while in central California a smaller but nevertheless important draft is made upon the same source.

It is probable that it would be safe to apply percentages but slightly less than that determined in the state of Michigan to the entire United States, and to state that nearly 75 per cent of the population depends directly upon underground waters.

¶A Montana farmer received a $5,000 prize at the Minneapolis Land show for a single bushel of wheat.

Galveston's Great Sea Wall Which will Probably be Extended a Distance of Five Miles

EXTENDING GALVESTON'S SEA WALL FIVE MILES

Galveston's gigantic sea wall, which was constructed after the disaster of 1900, will probably be extended a distance of five miles and the ground adjacent graded to at least double the present area on account of the rapid growth and commercial activity of the city. The proposed extension will be constructed like the present wall, which is made of reinforced concrete placed upon solid piling, driven 40 ft. into the hard clay underlying the sand. Back of the wall is a 16-ft. sidewalk and a wide boulevard. Behind the paved street is a graveled earth slope about 100 ft. in width for turning back the sea water. It is estimated that the extension with its accompanying grade raising will cost at least $5,000,000 and provide a protected area sufficient for practically double the city's present population, which is about 41,000.

CANAL BANKS HARMED BY ONE-PROPELLER BOATS

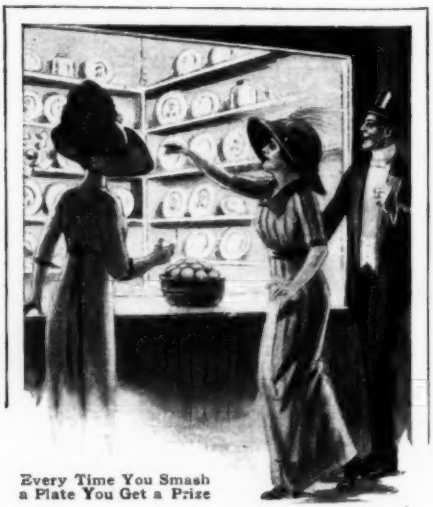
Motorboats with two propellers are less destructive to canal banks and bottoms than those with one, according to tests conducted by a shipbuilding concern of Germany. It was found that the destruction of the banks, while primarily due to the motion given to the water by the propeller, depends especially upon the position of the rudder and the propeller, and that the destructive action may be lessened by having one rudder on each side of the propeller. It was also discovered that the revolutions of twin propellers must be 15 per cent greater when turning toward than when turning away from each other, in order to maintain normal speed.

PAIR OF TROUSERS MAKES A DELIVERY WAGON

For freakish advertising on wheels the delivery wagon just built for a western tailor takes a prize. It is built in the form of a pair of trousers and when the driver is on the box he appears to be seated inside of this gigantic article of dress. The receptacle

Odd Delivery Wagon for Tailor

for containing packages to be delivered is in the shape of a cube on which the wearer of the giant's breeches sits.



Every Time You Smash a Plate You Get a Prize

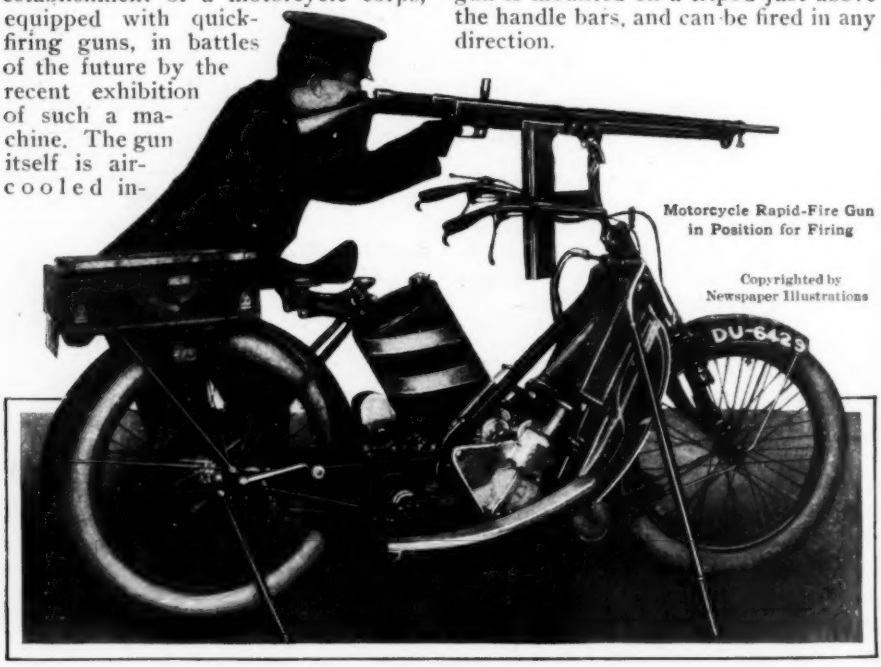
SMASHING POTTERY IS LATEST GAME

The smashing of china in an emotional dining scene on the stage has always produced more or less hilarity in the average theater audience, and now the latest popular ball-throwing game in Europe is the smashing of pottery. Inexpensive pottery, comprising such articles as plates, cups, and the like, are arranged on shelves. The more pottery the player smashes the greater the prize.

The railroads of the United States have protested against the low rates paid for hauling mails, and want the mail matter weighed annually instead of every four years.

QUICK-FIRING GUN MOUNTED ON MOTORCYCLE

Attention is drawn to the possible establishment of a motorcycle corps, equipped with quick-firing guns, in battles of the future by the recent exhibition of such a machine. The gun itself is air-cooled instead of water-cooled, fires 300 rounds per minute, and weighs only 16 lb., which is remarkably light as compared with the 46 lb. of previous types. The gun is mounted on a tripod just above the handle bars, and can be fired in any direction.



Motorcycle Rapid-Fire Gun in Position for Firing

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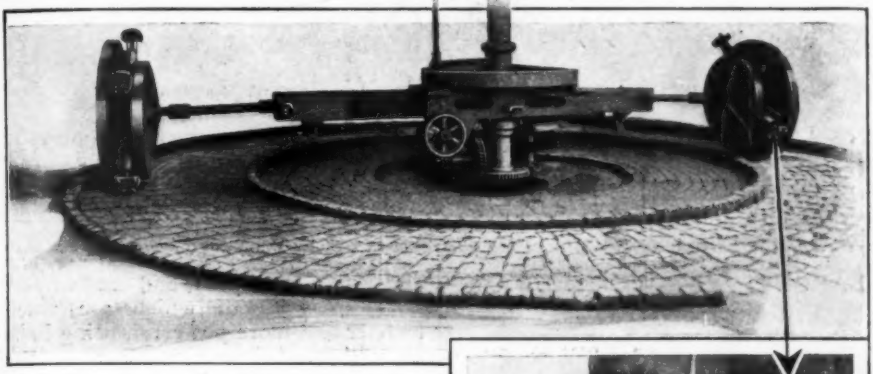
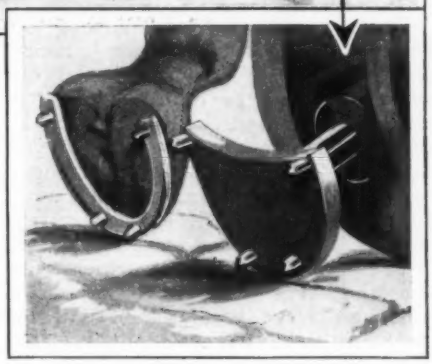
MACHINE FOR TESTING PAVEMENTS



Machine for Testing the Wearing Qualities of Various Pavements

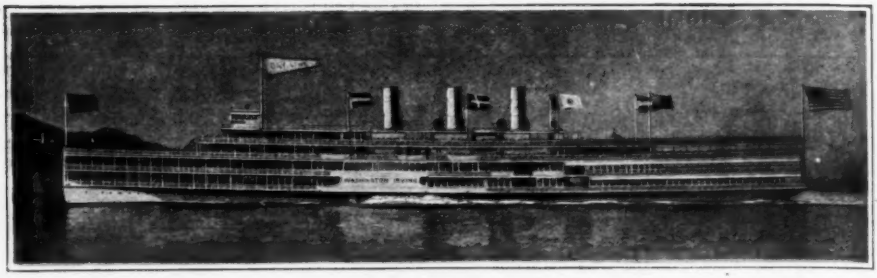


Horse's Shod Hoof Compared with Pavement-Testing Plunger

A new machine for testing the wearing qualities of various paving materials, and known as a "paving determinator," has been recently demonstrated in Detroit with remarkable success. The machine, which has been designed to reproduce, as near as possible, the actual effects of traffic to which a pavement may be subjected, consists of an upright steel post having a large gear near its lower end for revolving the shafts upon which is fastened the testing apparatus. The apparatus is composed of double interchangeable wheels, weighing 1,400 lb., at each end of the horizontal shafts, which are so constructed that the outside wheels or disks may be removed and disks corresponding to the widths of different wagon tires substituted when desired.

Probably one of the most remarkable features of the paving determinator is its ability to faithfully reproduce the effect of a shod horse. This result is accomplished by means of five plungers connected to the horizontal shaft between the two wheels, each plunger having attached to its outer end a plate shaped like the bottom of a horse's hoof. Each plate has fastened to its surface four steel points, similar to the calks worn by horses on their shoes during cold weather. When the apparatus is put in operation, a cam, geared to the horizontal shaft between the two wheels, causes the hoof-shaped plate to strike the paving at a pressure of about 150 lb. as the wheels travel around the circular pathway. This striking action is instantly followed by a movement that reproduces the ankle motion of a walking horse, the effect of which is said to be exactly similar to the wear occasioned by shod horses. By a special arrangement the wheels, as they travel, are caused to move back and forth upon the shaft, thus thoroughly testing a given width of paving surface. The determinator is operated by a 6-hp. engine, and speeds varying, at the wheels, from 3 miles to 12 miles per hour may be developed.

¶It costs about $15,000 to kill a man in modern war, according to President Jordan of Stanford University.



The "Washington Irving," to Operate as a Day Boat between New York and Albany on the Hudson River

LARGEST SIDE-WHEELER ON THE HUDSON

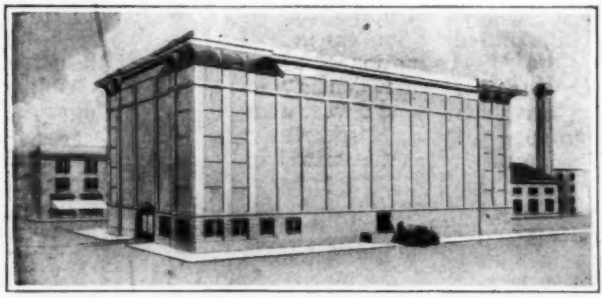
The new side-wheeler "Washington Irving," built for day service between New York and Albany, is the largest vessel of the type operating on the Hudson River and the third largest in the United States. She is 416½ ft. long, has a beam of 86½ ft., and will carry 6,000 passengers. She has four decks, the available deck area for passengers being 66,564 square feet.

The two side-wheelers which outstrip the "Washington Irving" in size, are the "Seeandbee," which will be placed in service between Cleveland and Buffalo this year, and the "City of Detroit," both of which are much heavier and more powerful, being built to withstand heavy weather on the Great Lakes. The "Seeandbee," illustrated elsewhere in this issue, is 500 ft. long, with a beam of 96½ ft.

¶A large number of electrical devices used by Alessandro Volta, the famous inventor from whose name the electrical term "volt" was derived, together with many of his letters, manuscripts and drawings, were recently discovered in a small Italian town by an English scientist.

BUILDINGS CONSTRUCTED OF ASBESTOS

Asbestos plaster, used in the same manner as concrete at the present time, will, so a western construction concern believes, solve several problems. It is claimed not only that buildings constructed of such material would be absolutely fireproof, no matter how hot a fire might be raging on either side, but that the use of such plaster, which is a poor conductor of heat, would save fuel in winter and keep interiors cool in summer. Asbestos is also soundproof, which is an additional feature of importance, particularly in the construction of hotels, factories, and the like.



Cold-Storage Warehouse to be Constructed in Denver of Asbestos Plaster

Several garages have been constructed of the asbestos plaster, and the large cold-storage warehouse shown in the illustration is to be built in Denver. The asbestos plaster to be

used in this building will contain about 40 per cent of what is called ground asbestos serpentine. In the plans for erecting a hotel of this material, it is proposed to use metal lath inside and out, the outer walls to be covered with a 2-in. coat of asbestos plaster, the space between the outer and inner walls to be filled with a mortar of asbestos and granulated cork, and the inner wall to be plastered with a mixture containing considerably less asbestos than the outer wall. The floors and ceilings of this structure would be formed of asbestos concrete, and all doors would be of metal lined with asbestos.

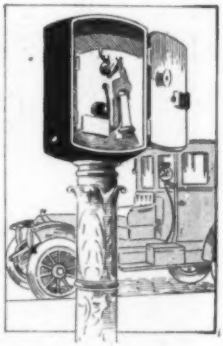
UNDER-WATER BRIDGE BUILT TO CARRY PIPE LINE

One of the curious construction feats carried out by engineers was the building of a bridge across the bottom of a river to carry a water main. When the river section of the pipe line was reached, it was discovered that the bottom was of such unstable character that the pipe could not be laid in any of the ordinary ways. Therefore a regular bridge of timbers was laid under the flowing water to support the line.

Last Photo of Kearny and Lawrence When Starting on Their Fatal Voyage from East Newport for San Francisco

PATROL BOX EQUIPPED WITH FIRST-AID KIT

All the police telephone boxes in the downtown district of Los Angeles have been equipped with the necessary medical and surgical materials required to give quick aid to victims of an accident, while waiting for the ambulance to arrive. Done up in a small package, which does not interfere in any way with the telephone apparatus in the box, are two antiseptic compresses of sublimate gauze in oiled paper, antiseptic bandages, cambric bandages, safety pins, and other necessary equipment.



STARTING AUTO ENGINES BY PULLING A STRAP

A method of starting the automobile engine by pulling a strap instead of turning a crank handle has been invented by a Londoner. A pulley engages with the ordinary crosspin on the engine shaft, to which a starting handle would be fitted in ordinary practice, and a leather strap is coiled around the pulley. The pulling of this strap causes the engine to revolve many times. The strap method of starting the engine is claimed to require far less labor than cranking.

¶Three men, working in shifts so arranged that only two of the men were on the job at a time, laid 58,000 bricks in a Fulton, N. Y., street in one day, which is claimed to be a record.

ROOF ILLUMINATION AT PARIS MOTOR SHOW

The illustration shows a section of the remarkable roof illumination of the Grand Palais, Paris, used during the

A Section of Roof Illumination Used in Automobile Exhibition Building, Paris

recent automobile exhibit. The dimension of the elliptical dome is 146 ft. by 137 ft., and the wings of the design extend a distance of 118 ft. on each side.

¶The 12 most important mineral products in the United States, according to the U. S. Geological Survey, are, in the order of value of annual output, coal, iron, clay products, copper, petroleum, gold, stone, natural gas, cement, lead, silver, and zinc.

FIRE LOSSES DURING 1912 IN U. S. AND CANADA

The losses by fire in the United States and Canada during 1912 aggregate $225,320,900, or $9,016,350 less than for 1911, and $9,149,750 below the amount recorded in 1910. Although these figures indicate a decrease within the past three years, the losses in these two countries during the past 36 years show that the fire risk is steadily increasing, due in part, probably, to new factors of civilization that tend to produce new fire risks. The losses during 1912 were distributed over a wide area of country and the heaviest ones occurred during the first two months of the year. The most disastrous conflagrations were those at Houston, Tex., where a loss of $4,500,000 was sustained, and the burning of a life-assurance society's building in New York, which caused an estimated loss of $3,000,000.

HOW IT FEELS TO FREEZE TO DEATH

Freezing to death is preceded by a drowsiness which makes the end painless, the body actually feeling warm and going comfortably to sleep. Experiments have been made with animals to show just how freezing to death proceeds. In one of these experiments, in which the animal was placed in a temperature of from 125 to 150 deg. below zero, the breathing and heartbeats were at first quickened, the organic heat of the body actually rising above the normal, which is 98.6 deg. F. This showed a sudden and intense effort on the part of the functions to preserve the body's temperature. Then violent heart action gave out suddenly, and death came when the temperature of the body dropped to 71 deg. F.

¶The oldest submarine cable in operation in North America is between Prince Edward Island and the Dominion of Canada. It was laid in 1853.

Courtesy Chicago Tribune

Chicago Police to the Rescue of a Boy Who was Blown Out onto Lake Michigan on a Cake of Ice. One of the Patrolmen Went through the Ice into the Lake in Trying to Reach the Boy on Foot before the Ice Broke Away from the Shore

DEAF-MUTES MAY NOW FEEL TEACHER'S SPEECH

An apparatus which promises to be a valuable help in teaching speech to deaf-mutes was recently demonstrated before an association of teachers in Leipzig, Germany.

Very ingenious in conception, the apparatus does not differ in principle from the method actually followed in giving deaf-mutes instruction in sound production, which consists in allowing the pupil to touch the teacher's larynx —the site of the vocal cords—while the latter is pronouncing some word and at the same time spelling it with his hand, the pupil being required to imitate the formation of the teacher's mouth, the motions of his lips and tongue, and the rhythmic vibrations of his vocal cords. But the great improvement over this method lies in the fact that, by mechanical means, a sense of these vibrations can be conveyed to a number of pupils simultaneously; and this is accomplished in the following manner:

Two large turnable mouthpieces lead the sound waves to a special telephone instrument between them, and the waves are there transformed into electrical impulses. The telephone is connected with an induction apparatus which receives the electrical impulses and transmits them, in the form of rhythmic shocks, to the pupils' hands, to which are attached the terminals of the inductor. While speaking, the teacher holds a microphone transmitter to his larynx, this microphone being

Teacher Talking into Apparatus Which in Turn Imparts Electric Shocks to Hands of Deaf-Mute Pupils, in Accord with the Vibration of His Voice

connected to another induction apparatus, at the terminals of which the vibrations of the vocal cords can also be felt. Thus the telephone and the

microphone at the larynx coöperate to strengthen and complement the sensing of these vibrations by the pupils.

In order to leave one hand of the pupils free, the terminal cords of the two shocking machines are connected to one hand only, on the forefinger, the little finger and the wrist. Two rheostats, connected into the circuit, make it possible to regulate the current so that the shocks, while easily perceptible, are quite faint.

Thus, when the teacher speaks, all the pupils feel the shocks, now in one finger, now in another, and sometimes in both, at the same time perceiving the varying strength and duration of the shocks. Each pupil has a microphone in the other hand and one of the mouthpieces can be turned to either of them, so that he, in trying to imitate a sound, can compare the effects of his imitation with those produced by the teacher's spoken word, and he can also perceive the speech of the other pupils.

In this manner it is possible to teach deaf-mutes whole classes of sounds, that they are not able to read off from the mouth of the teacher; but the greatest advantage of the apparatus consists in the possibility it creates of teaching these unfortunates rhythm and accentuation, without which no speech is thoroughly understandable.

CLEARING STUMP LAND BY BLOWPIPE PROCESS

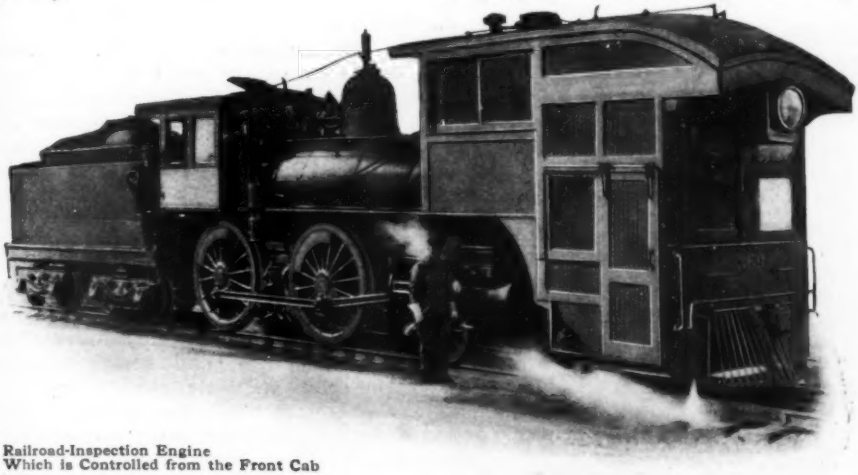
The logged-off land of the Pacific coast, heavily studded with stumps of great size, presents a stump-clearing problem that would be given up in dismay by the farmer of the middle west, yet this land is being rapidly cleared by a blowpipe process that is proving remarkably efficient and economical.

During the past two years hundreds of farmers have cleared land by this process, which consists of digging a portion of the earth away from the stump, starting a fire, and directing a blast of air against the fire from a pipe connected to a blower, driven by a small portable gasoline engine. Even with the small, individually owned outfits, having an engine of only 4 or 5 hp., the main pipe from the blower may have three or four branches, extending to as many stumps, and with the large outfits used by the several land-clearing companies now operating, a considerable number of stumps are burned at once. One of these commercial out-

Courtesy Gas Power

Burning Stumps on the Pacific Coast by the Blowpipe Method

fits, for instance, has a 50-hp. engine, which is belted to a dynamo furnishing current to 30 or 40 motor-driven blowers. Such a plant will clear five acres per day.



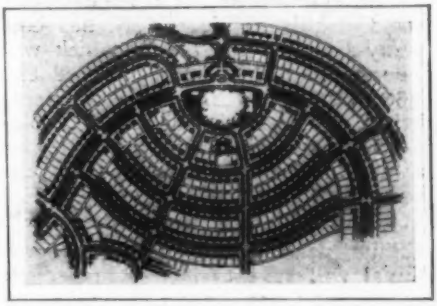
Railroad-Inspection Engine
Which is Controlled from the Front Cab

TRACK-INSPECTION ENGINE WITH FRONT CAB

The operating mechanism of the new type of engine used for inspecting the tracks of the Chicago, Burlington and Quincy Railroad is so arranged that the official making the inspection has complete control of the throttle and air brakes from his seat in the front cab, while the fireman usually rides in the engine cab proper. The headquarters of this engine are at Galesburg, Ill., and it is used on all Burlington lines east of the Missouri River.

A MODEL TOWN FOR WORKMEN

An industrial town along distinctly model lines for workmen is under construction near Tuscaloosa, Ala. The plan provides for all modern improvements, such as sewers, gas, water, electric lights, street-car lines, park and parkways, a civic center, etc. The streets are being laid in the shape of a fan and follow curves, yet a larger number of lots are gained than would be possible by following the ordinary plan of street design. The town, which is situated near an extensive lumber plant, has a street 80 ft. wide extending from the civic center, or public square, to the lumber mill, near which is located the commissary, or store, for supplying the workmen with food and other household necessities. The ground surrounding the public square, which contains a drinking fountain and flagstaff, will be divided into an athletic field; space for various games by adults; a children's playground, and shelters where mothers may sit in the shade while their children are using the playgrounds or wading in the adjacent pools of water. The houses or cottages of this model town are of a type similar to the California bungalow, with roofs sloping toward the

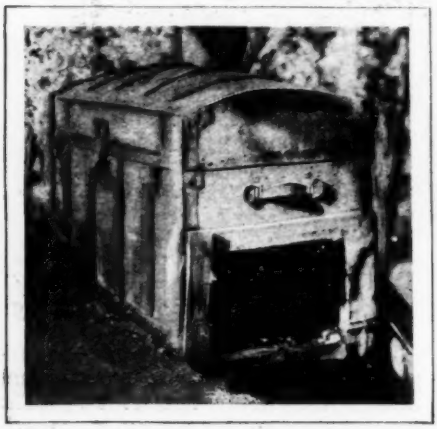


A Model Town for Workmen, near Tuscaloosa, Alabama

street. Climbing vines will screen the view from street into rooms, and flower boxes will be provided. The town is designed to permit of expansion as rapidly as conditions may warrant.

TURKEYS RAISED IN A TRUNK

Turkeys are raised in an old trunk by a Californian who claims that he has not lost a single fowl from colds



Trunk Used as House for Young Turkeys

caught through drafts since adopting this odd form of house. The trunk has a door at one end, but when the weather is cold the lid is raised so the sun can shine in upon the young brood instead of letting them out in the wind.

THE DEATH LIST OF NEW YORK'S AQUEDUCT

The building of the aqueduct from the Catskills to New York has cost many lives. Since the first pick was swung 200 men have been killed and 3,800 injured, most of the accidents being the result of dynamite explosions. At the present time there are about 11,000 men employed on the aqueduct.

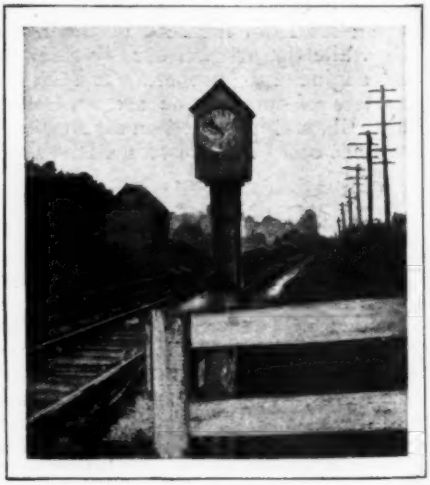
¶Ships passing through the Panama Canal will have to pay $1.20 per net vessel ton (each 100 cu. ft.) of actual earning capacity.

A SIGNAL STOP CLOCK

We often hear of stop watches, but seldom, if ever, of stop clocks. The picture illustrates a clock that stops and then runs ahead and catches up with the time it has lost.

The function of this clock is to stand on a right of way and tell the approaching motorman the time at which the last train passed the spot in the same direction. By consulting his own watch and noting the position of the hands on the track clock he knows exactly how far behind the other train he is running. The approaching car, by electrical arrangement, stops the clock, leaving the dial indicating the passing moment. The next car releases the hands which quickly move ahead to the exact time and then the mechanism again stops the clock.

There are really two clocks, one inside the other, the smaller one ticking off the lapsed time and serving to release the hands on the big dial. The device has some advantage, but is in a way misleading, as a train might pass a clock a short distance, become disabled for an hour, and hence be but a few minutes' running time ahead, instead of the full hour indicated by the clock.



Stop Clock for Signaling

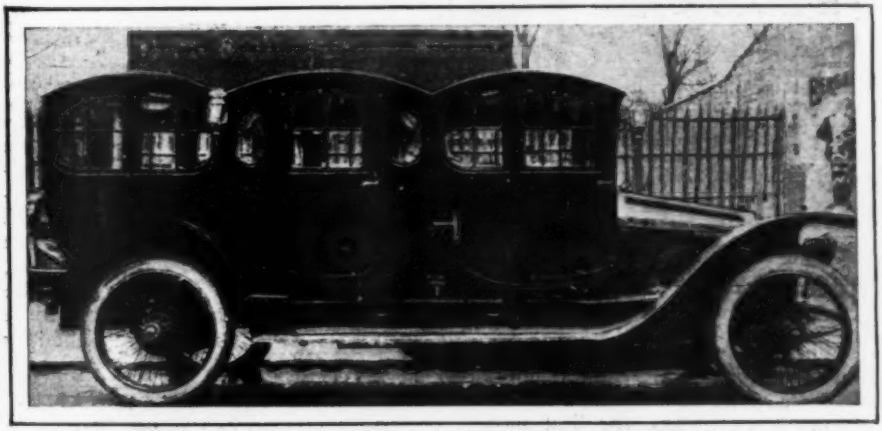
THE MELTING POINTS OF FIRE BRICKS

According to the United States Bureau of Standards the melting points of fire bricks are as follows: The most common fire brick, or those made of clay of which the main ingredient is kaolin, will melt at a temperature ranging from 2,831 to 3,137 deg. F.; bauxite brick, from 2,949 to 3,245 deg.; silica brick, from 3,092 to 3,101 deg.; chromite brick, at 3,722 deg., and magnesia brick, at 4,929 deg. These melting points, which represent the lowest temperature at which a small piece of the brick could be distinctly seen to flow, were determined in an electric vacuum furnace, the temperature being measured with an optical pyrometer.

¶A lightning detector that has an arrow which points upward until released by lightning, when it turns and points toward the ground, thus indicating the passage of the lightning, is used on the lightning rods of a tall concrete stack in Topeka.

TRIPLE "BERLINE" IS HANDSOMEST CAR

The handsomest car exhibited at the recent automobile show in London was a triple "berline" turned out by a French firm. Berline is the name adopted by automobile builders to indicate the coachlike type of body. The triple berline has seating accommodation for six persons, the seats being of the armchair variety, upholstered in silk brocade. The windows are of the Louis XV type with beveled-edge glass.



Said to be the Most Luxurious Car Exhibited at the London Motor Show

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¶Cinders can be removed from the eye with a piece of soft chewing gum.

DOLLS THAT LOOK LIKE REAL BABIES

Out of Germany, which furnishes the quaintest and most artistic productions of toyland, has come a new series of

Realistic Dolls Originated by the Wife of a German Sculptor

dolls which are almost as real, as far as appearance is concerned, as genuine babies. They cost $15 each, but it is said that they will wear through more than one generation of children.

The originator of these dolls is the wife of a German sculptor of the realist school. He objected to having his children play with the dolls commonly sold, insisting that they were like nothing on earth or in heaven. These dolls, which are of the rag-doll variety, are the result. They will stand on their feet as a baby stands, are unbreakable, and can be washed.

¶ Luxuries, such as art works, precious stones, laces and embroideries, china, liquors, tobaccos, etc., are being imported into the United States at the rate of $1,000,000 a day, according to government statistics.

THE CALENDAR STONE OF THE AZTECS

The famous Aztec calendar stone, now in the National Museum of Mexico, is a block of basalt weighing 25 tons and having a diameter of 11 ft. Encircling the head of the sun god is a diadem bearing hieroglyphics representing the divisions of time and the Aztec method of numbering the years. The number of days in their year was 365, as in ours. Each year had a different emblem repeated every four years. The first year was called Tochtli, or rabbit; the second, Acatel, or reed; the third, Teeptal, or flint; the fourth, Calli, or house. The years were further arranged by thirteens, four such periods making a Mexican age.

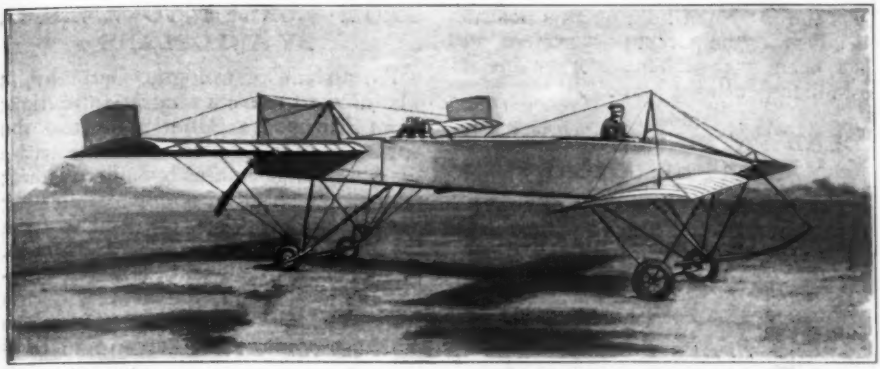
When the City of Mexico was taken by Cortez, in 1521, and the great temple destroyed, the calendar stone was left in the square. It was buried in 1555, and not recovered again until 1790.

ICE-CREAM SLOT MACHINES

Dropping a nickel in a slot machine and getting in return a dish of ice cream is one of the many things possible in a new automatic restaurant recently opened in New York. In the same row with the ice-cream machine are other slot machines for melons, oranges, and other fruits that require to be kept at a cool temperature to be at their best. This is accomplished by a system of refrigeration.

RAILROAD OF NUMEROUS TUNNELS

A railroad with tunnels aggregating practically one-fifth of the total length of the line has been constructed in the French Alps. The road has 18 tunnels in a total length of about 15 miles, the longest being 5,740 ft. The estimated cost of building the single-track line, which also has nine viaducts, is approximately $200,000 per mile.



Courtesy Aeronautics

New System of Aeroplane Support

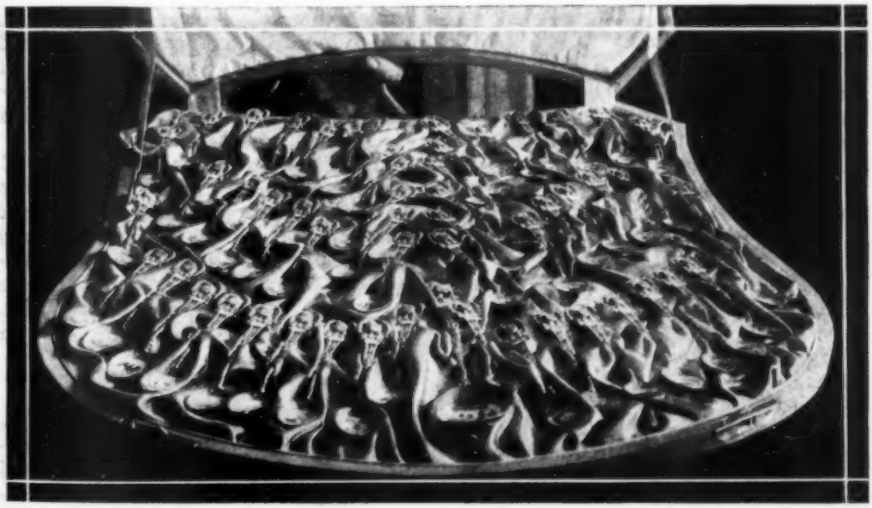
FLYING-MACHINE PLANES PLACED TANDEM

The new system of supporting surfaces for aeroplanes which was recently evolved consists of two planes of equal size placed tandem and slightly inclined downward toward each other, as shown. It is claimed that this arrangement obtains a degree of fore-and-aft stability not possible by any other method, and an efficiency greater than the efficiency of either surface alone, when the two surfaces are placed at certain flying angles.

FIRST WHITE-HOUSE PARCEL-POST PACKAGE

The first package received at the White House by parcel post was a set of gold spoons presented to President Taft by John Wanamaker of Philadelphia. This set comprises 49 spoons, one of which represents the District of Columbia, while each of the others represents a state and has the coat of arms of the state reproduced in enamel work upon the bowl.

John Wanamaker, who served as Postmaster General from 1889 to 1893,



John Wanamaker's Gift to President Taft; the First Package Received at the White House by Parcel Post

was the first man holding this position to advocate the parcel-post system, and has been a consistent worker for its establishment ever since.

DEAD PATRIARCH'S THRONE HIS FUNERAL CAR

The remarkable spectacle of conveying the remains of a dead patriarch of the Greek Church through the streets

Conveying Dead Patriarch to His Grave upon His Throne

of Constantinople to his grave, upon the throne which he occupied during life, was witnessed recently. The body was clothed in the deceased leader's sacerdotal vestments, and the funeral procession was led by archbishops of his church, accompanied by a guard of Russian marines.

STAMPS WORTH A FORTUNE SOLD FOR SIXTY DOLLARS

Canceled postage stamps worth a fortune were sold with waste paper for $60 when a banking firm of Philadelphia recently disposed of some very old correspondence preparatory to moving into new offices. There were 12 boxes in the lot, and it was appraised at $75,000 by an expert.

FROM EUROPE TO AMERICA BY AEROPLANE

An airman of Cologne, Germany, is planning to make a transatlantic flight from Europe to America during the spring and expects to cover the entire distance of 2,855 miles in 33 hours, or at an average speed of about 87 miles per hour. He proposes to embark from the west coast of Spain with 2,200 lb. of fuel aboard and make his first landing upon Terceira, the nearest of the Azores Islands and 990 miles from the starting point. At Terceira he will take on another supply of about 4,400 lb. of fuel and then proceed direct to Halifax, a distance of 1,865 miles. The flying machine will be a monoplane about 32 ft. long with a span of 55¾ ft. and a total plane surface of 550 sq. ft. Steel tubing will be used for the framework; the body is to be shaped like a boat and completely inclosed, and two motors driving two propellers will furnish the motive power.

ARCTIC EXPLORATION BY MOTORBOAT

It would seem, at first glance, that a 25-ft. motorboat, driven by an engine of only 12 hp., would be inadequate for arctic exploration, except, perhaps, as a tender for a larger vessel, yet Donald B. McMillan, who was a member of Admiral Peary's expedition in the successful dash for the North Pole, has used such a vessel with success.

McMillan, accompanied by H. C. Bent, started out from Boston in the little exploration motorboat, cruised along the Maine coast, thence around Nova Scotia into the Gulf of St. Lawrence, then through the Straits of Belle Isle and up along the coast of Labrador. The motorboat is heavily plated as a protection against arctic ice.

¶ Approximately 37,002,207,000 ft., board measure, of lumber were produced during the calendar year 1911 by 28,107 mills, as against 40,018,282,000 ft. reported by 31,938 mills in 1910.

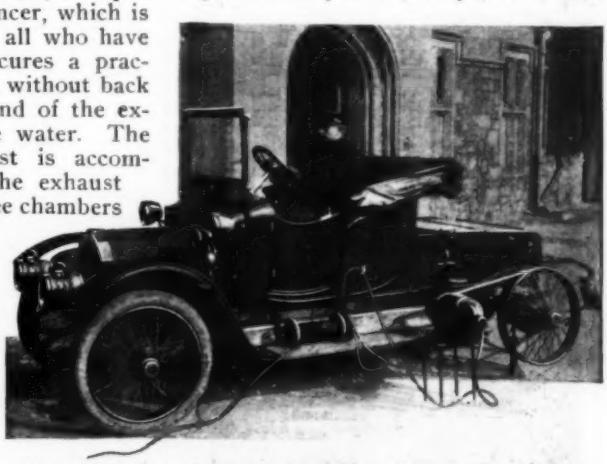
SILENCER FOR MOTORBOAT ENGINES

A very effective form of silencer for motorboats has been developed along the lines of the rifle silencer, and put on the market. The silencer, which is meeting the approval of all who have seen it in operation, secures a practically noiseless exhaust, without back pressure and with the end of the exhaust entirely above the water. The silencing of the exhaust is accomplished by permitting the exhaust gases to whirl within three chambers until their energy has been expended. The device consists of a shell in which are contained three chambers, into the central one of which is led the exhaust gases from the engine. As the gases pass through these chambers in a whirling manner their velocity is decreased sufficiently to allow them to escape through the exhaust vent into the open air with practically no noise. The silencer may be used either with or without cooling water and there are no small holes or passages in the device to become clogged with grease or dirt.

¶Not a single boiler explosion occurred in Montana during the past four years.

USING MOTOR CAR IN X-RAY WORK

A motor car with a dynamo attached to its body for the purpose of supplying electricity for X-ray work and giving various forms of electrical treatment to patients at their homes, is being used. The dynamo, which is fastened to one side of the car, immediately in front of a rear wheel, is connected to this wheel by means of a round belt and driven by the same power used to propel the car. The tire of the wheel is removed and a support serves to hold the wheel in an elevated position when the dynamo is being operated.



Portable Dynamo Used by Doctor in Giving Electrical Treatment to Patients at Their Homes

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Courtesy Florists' Review

Conveying a 65-Ft. Palm for Replanting at the Entrance of the Grounds of the San Diego Exposition of 1915

LOUD-SPEAKING TELEPHONE AS VENTRILOQUIST

To have a friend who is known to possess absolutely no ventriloquistic ability step out upon a stage and carry

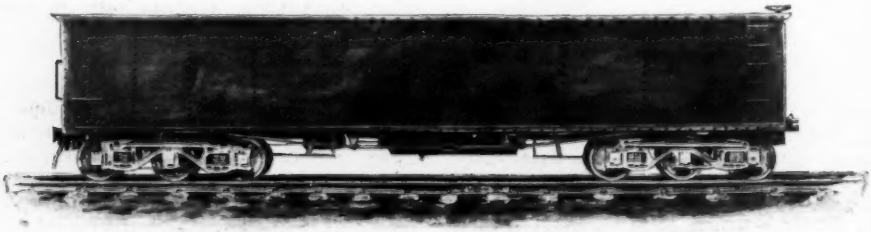
Any Man can be a Successful Ventriloquist with This Manikin

on a performance that would shame the best professional ventriloquists in the country would be cause for surprise to the uninitiated, yet it is a simple matter. All that is necessary is to place a loud-speaking receiver in the body of the manikin with the horn or large mouthpiece directed toward the audience, the receiver being, in turn, connected to a special transmitter in a dressing or anteroom some distance away; conceal an ordinary operator's breast transmitter in the body, so that anything said by the "fake" ventriloquist can be heard by the assistant, and arrange a number of electromagnets for the movement of the jaw, head, and arms.

The idea was successfully carried out recently at a convention of telephone men in New York, and at a dinner in Chicago. The "fake ventriloquist" stands several feet away from the manikin and simply asks questions or makes requests, the assistant behind the scenes doing the work. The assistant, who should also be a singer, so as to respond to the request for songs, is provided with a list of answers to the various questions. While speaking or singing into the special transmitter, the assistant also manipulates a telegrapher's key controlling an electromagnet which causes the manikin's jaw to move. By the use of additional electromagnets and keys, the manikin's head can be made to turn from side to side, and the arm be raised in a salute.

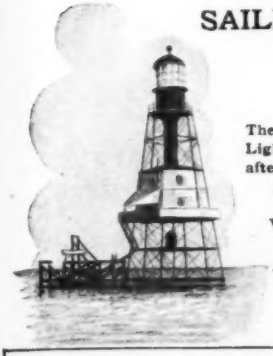
A HUNDRED-TON COAL CAR

A coal car that has a capacity of 100 tons is being tested by the Norfolk and Western Railroad Company. The body of the car is 45 ft. 6 in. long, 9 ft. 6 in. wide, and 6 ft. 6 in. deep. The car complete, without load, weighs 65,200 lb., of which 35,400 lb. are in the body and 29,800 lb. in the trucks. These are specially designed to equalize the weight on the wheels and have the standard freight-car journal boxes.

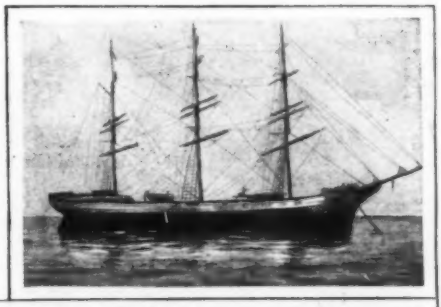


The Largest Coal Car Ever Built

SAILING SHIP WRECKS LIGHTHOUSE



The South Australian Lighthouse before and after the Wreck, and Three-Masted Sailing Ship Which Collided with It



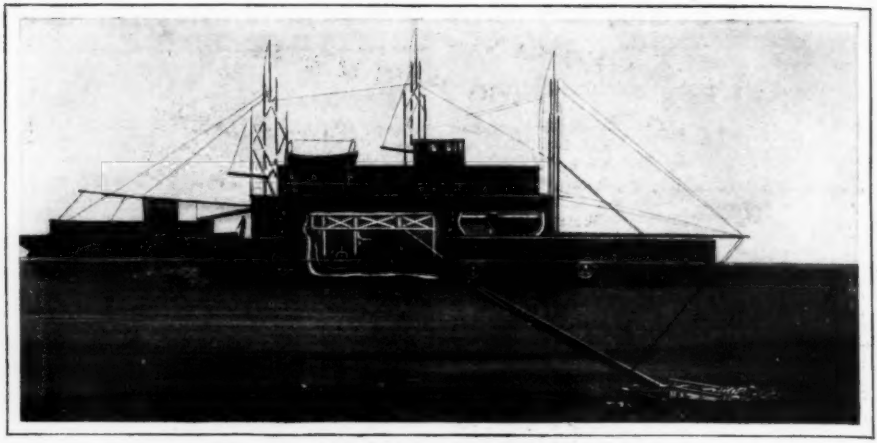
The wrecking of the Wongo Shoal lighthouse off the coast of southern Australia by the sailing ship "Dimsdale" will probably go down as one of the most unusual accidents in modern sea annals, considering the fact that the express purpose of a lighthouse is to warn mariners to keep away from a dangerous locality and that the ship not only entered the danger zone but actually struck the lighthouse while sailing under fair weather conditions.

The explanation of the accident given by the captain of the "Dimsdale" was that the ship refused to "pay off." When about two miles from the light, which lay in the direct course of the ship, the captain ordered the wheelsman to "put the helm up," but the vessel seemed more inclined to "come to" than "pay off." Then the afteryards were ordered squared, the ship still refused to pay off, and the lighthouse was struck full on. The steel framework of the lighthouse crumpled up like paper, the ship receiving no appreciable shock from the collision. The lighthouse keeper and his assistant were both drowned.

IOWA'S VAST OUTPUT OF DRAIN PIPE

Iowa's annual production of drain pipe, at the present output of its numerous plants, would reach, if placed end to end, a distance of 25,000 miles. This output represents 28 per cent of the total production of drain pipe in the United States.

¶ Placing a patient under the influence of ether by injecting it into a vein instead of breathing the fumes into the lungs has been successfully tested at the Kings County Hospital, Brooklyn. The advantage claimed for injection is the absence of nausea.



Dredging Oysters from the Sea Bottom

COMBINATION GOGGLES AND EAR GUARDS

Automobile goggles which terminate in guards for the ears are shown in the accompanying diagram. The ordinary ear muffler is not satisfactory because the wearer's hearing is obstructed by it, but this type of ear protection is said not only to provide protection from cold and wet, but also to aid the hearing. The wearer can hear noises about the automobile that would be indistinguishable with the wind whistling by his ears.

¶The total amount of iron ore mined in the United States in 1912 was between 54,500,000 and 57,500,000 gross tons, an increase of 25 to 32 per cent over the production of 1911.

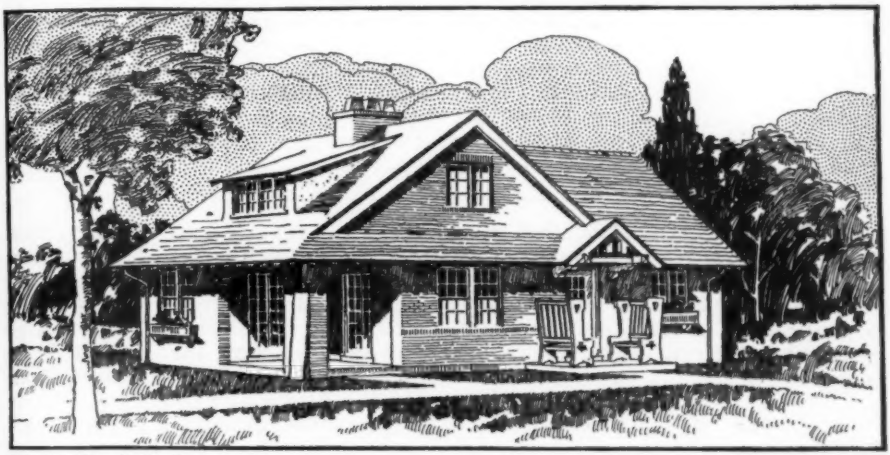
DREDGE CONSTRUCTED TO HARVEST OYSTERS

A special dredge of large capacity has been constructed at Bridgeport, Conn., for the harvesting of oysters. A conveyor arm, containing an endless belt, and terminating in a scoop, picks up the oysters from the sea bottom and discharges them into bins. The dredge is constructed with three hulls, the two outside ones being longer than the inner, which carries the power plant. The conveyor arm is hinged to a cradle which is hung on a shaft running lengthwise of the vessel, the arrangement being such that the rocking of the boat by the seas does not affect the conveyor arm and scoop.

The scoop consists of a comblike bar, provided with a deflecting shield, and is carried on a wheeled carriage. The teeth with which the bar is provided combs up the oysters, and the shield deflects oysters and water into the carrier, whereupon the endless belt does the rest.

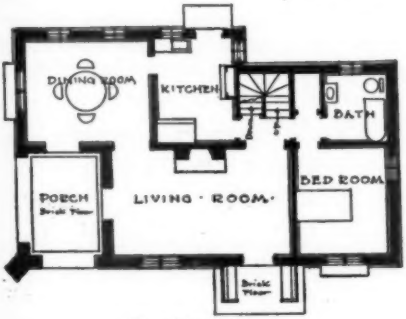
¶The Republic of China is to adopt a gold standard. For every dollar the gold coin shall contain seventy-five one-hundredths of a gram pure gold, which gives it the same value as the Japanese yen, or about 50 cents American money.

THREE-THOUSAND-DOLLAR BRICK BUNGALOW

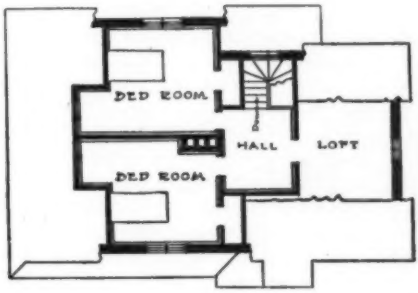


Wm. J. Ryder, Architect

Side and Front View of the Bungalow



First-Floor Plan



Second-Floor Plan

These plans were submitted in a competition for a brick house of the bungalow type costing $3,000. On the ground floor is a living room, 12 by 19½ ft., a dining room, 11½ by 14 ft., a 12 by 12-ft. bedroom, and a bathroom. The second story contains two 11½ by 12-ft. bedrooms, a fair-sized hall off the stairway, and a loft.

DRESDEN'S NEW STREET-CAR SERVICE

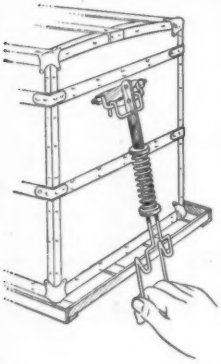
A new street-car service has been installed in Dresden which makes it possible for strangers to use the cars of that city without either speaking a foreign language or possessing any advance knowledge regarding the streets. Each of the car lines, of which there are 18, has been assigned a number instead of a name, and these numbers are indexed for public use. All of the cars belonging to lines having even numbers are painted red, and those designated by odd numbers are yellow. Each car has a conspicuous number on its front and a sign on the side that indicates the general route. On the interior is conveniently placed a piece of cardboard, on one side of which is a map of all the car lines, while the reverse side has a map showing the numbered sections into which the city is divided. The cars also contain a clock and signs indicating the terminals of

each line, so the passengers may know in which direction they are traveling.

To obtain better service the cars are permitted to stop only at certain places, all of which are indicated by red signs attached to the lamp-posts. The globes of these lamps show bands of red, and the zones in which the globes are found are indicated by bands of white paint—one band for each zone. As fares vary according to the number of zones traversed, the white bands assist the passenger in determining the correct fare. The lamp-posts have signs indicating the numbers of the car lines passing there, also the names and directions of the ends of each line or division.

HANDY BAGGAGE HOLDER FOR MOTOR CARS

A simple device, for securely holding baggage upon a framework, or grid, attached to the rear of motor cars, has been placed on the market. The holder is made of two rods, each fitted at the top with a curved piece of heavy wire for gripping the handle of the trunk, and a grip and handle at the lower end for fastening the device to the framework. The device, which also has a powerful spring for keeping the holder and trunk securely in place, is instantly detached by pulling down the handle and is adaptable for trunks of various sizes.



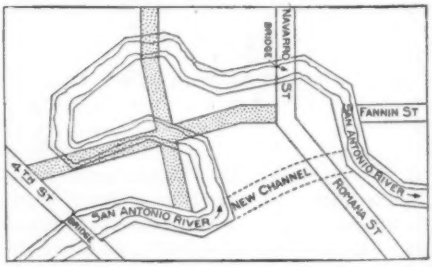
STAIRS BUILT AROUND FALLS FOR SALMON

At one or two small falls in this country and at Henley, in England, there have been constructed moving stairways or inclines to assist small boats from one level to another, but none of these compares in interest with the stationary stairway to be built by the British Columbia government for the passage of salmon over the falls in Meziadin River. This river connects Naas River with Meziadin Lake, which is the spawning ground of millions of salmon. The falls have a drop of 12 ft., and, at best, are a serious impediment to the fish, being almost impassable at low water. The fish's ladder or stairs is to be blasted at the side of the falls, and five steps will be provided, so that the highest jump necessary for the salmon will be about 2½ ft. At the foot of each step there will be a basin having a depth of several feet in which the fish can get a start for the jump.

There have been many seasons in which the salmon have failed to surmount the obstacle of the falls and gain their natural spawning ground.

STRAIGHTENING A RIVER TO MAKE CITY LOTS

A channel is to be dug to shorten the San Antonio River in the city of San Antonio by about 1,200 ft. The new channel will serve the purpose of improving sanitary and traffic conditions of that section of the city, and will also increase the taxable values a great deal. In return for the work, the contractor asks that the city give him that part of the river bed to be abandoned.



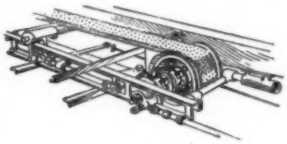
Plan for Reclaiming Land by Shortening River Channel in City of San Antonio

ODD DEVICES AT LONDON AUTOMOBILE SHOW

Among exhibits of the automobile show recently held in London, the five shown in these drawings received considerable attention. The drawings show a belt drive for automobiles, an emergency mechanic's seat that folds into the scuttle dash, a selectively operated emergency brake, an electric side lamp of novel design, and a rubber-steel nonskid tire.

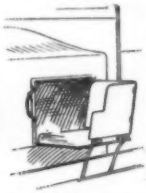
Selectively Operated Emergency Brake

Rubber-Steel Nonskid Tire



Belt Drive for Automobiles

Electric Side Light of Novel Shape



Folding Emergency Seat

The arrangement of the emergency seat for the mechanic is so clearly shown in the drawing as to require no further explanation. The selectively operated emergency brake made its appearance on a Daimler car. The object of providing two slots, in either of which the lever can be operated at the will of the driver, is to make possible its use either as a hand brake alone, or in conjunction with the clutch. In the latter case it cannot be applied unless the clutch is released, thus preventing "burning" of the friction surfaces on the clutch as well as on the brake bands and drums.

Although it has been a considerable time since the use of a belt as means of transmitting power to the rear wheels of an automobile has been generally considered, and its use even on the lighter types of the motorcycles is dying out, one type of large-sized automobile exhibited this year resorts to such transmission. The belt, which is 8 in. wide, serves to connect the driving pulley on the crankshaft of the motor to a pulley of like diameter on a countershaft. This countershaft is attached to the rear axle by means of radius rods, and forms, with the rear axle, a sort of under carriage which can be moved forward or backward by means of a pedal, loosening or tightening the belt according to the amount of power desired. Final drive to the rear wheel—for only one wheel supplies the tractive effort, with a consequent elimination of the differential—is by means of a roller chain inclosed in an oil-tight casing. The belt thus supplants the customary friction clutch. There was also ample evidence at the show of the tendency to adopt the chain drive wherever it could be usefully applied, as a means of adjustment for cam-shaft drives, for instance, and for magneto and gear-box drives.

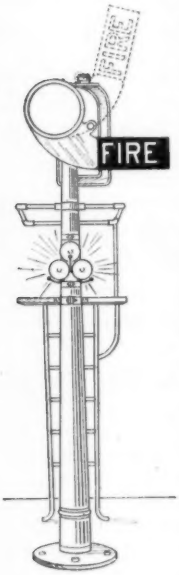
In the rubber-steel nonskid tire the weight of the automobile is distributed over the whole width of the tread, thus leaving the steel V's on each side free to take up circumferential and side slip. This is claimed to greatly minimize the friction caused in running, especially at high speed, and the steel V's, being completely exposed to the air, radiate the heat as fast as it is generated, thus constantly draining the tire and keeping it cool.

The electric side lamp is simple and neat in shape. It is furnished with faceted, red side lenses, and with silver-covered reflectors.

¶Through the gift of a prominent motion-picture manufacturer, Syracuse University is to establish a course of instruction in the art and chemistry of photography as related to motion pictures. This is the first motion-picture course in any college.

FIRE SIGNALS FOR BUSY STREET CROSSINGS

A "watch-out-for-the-fire-teams" alarm, somewhat similar to a railroad semaphore signal, has been suggested as a means of clearing the streets of traffic when fire apparatus is responding to a call. The idea is to erect one of these standards at every corner in the congested business districts of a city. The operators in the fire-alarm headquarters, knowing what routes the fire teams will take in answering an alarm, throw a switch which causes the semaphore, light, and bell of the street-crossing signals along the route to operate.



"CONSERVATION" IN HOLLAND

Holland thrift is renowned throughout the world, but some of the minor details of its citizens' economical habits may not be widely known. One of these is found in the management of the canals which traverse that quaint country. The edges of the waterways, where the soil and muck push out irregularly, are periodically edged off evenly, and every pound of muck so removed is loaded into boats and transported to fields for filling and fertilizing. At the bottoms of the canals a good quality of brick clay is found and from this brick are manufactured, at plants established on the canal banks. A large part of this work is done by the peasant women. The brick, somewhat imperfect in color, are used in roadmaking, under government supervision.

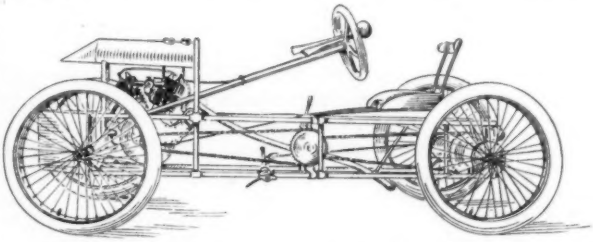
MOTORBOATS WITH RAPID-FIRING GUNS

Two speedy motorboats, each of which is equipped with an automatic Colt rapid-fire gun mounted on a tripod, are under construction in Manila for use in connection with a revenue cutter that is being built in that city for the purpose of putting down piracy in the Philippine Islands. The motorboats, which have been designed to develop an even greater speed than the cutter, will be used in pursuing the smugglers when they attempt to elude the revenue officers by sailing among the huge reefs that lie near the shores of the islands.

"SKELETON" CYCLE CAR FOR RACING

One of the latest racing cycle cars constructed in England is a skeleton compared with the average machine of the cycle-car type. It was built to minimize wind resistance, though at the same time the design insures adequate strength. The weight of the machine, complete, is but 225 lb.

When in use it is not, however, quite so skeletonlike as the illustration represents it to be, as the shields which inclose most of the mechanism, rendering it weather-proof, are not shown.



A Light, but Strong Design in Racing Cycle Cars

FISH THAT DIE FROM SEASICKNESS

Fish become ill and die from seasickness when carried long distances upon the ocean. For that reason many rare and interesting specimens captured in tropical countries cannot be brought alive to northern points for public inspection. In a recent shipment of 400 fish from Key West to New York more than 100 died on the way, and the remainder arrived in a condition that required heroic treatment to save their lives. According to this it may be presumed that the agony endured by humans when the ship begins to pitch and roll is as nothing compared with the same sufferings of tank-inclosed fish. As a precaution the fish are fed practically nothing for at least one day before being taken on board.

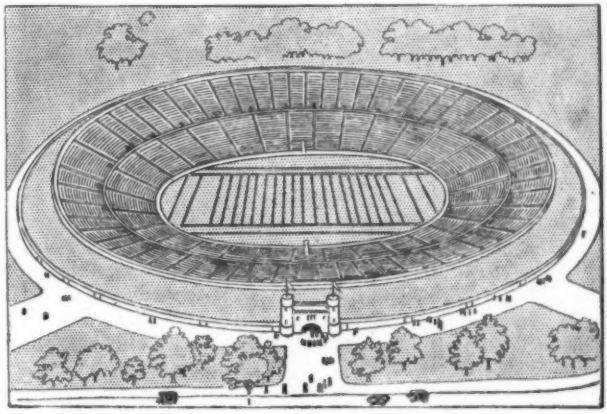
The galvanized-iron tanks, in which the fish are carried, contain from 10 to 50 gal. of sea water kept at a constant temperature of about 68 deg. by steam from the ship's boilers during the trip.

A PREVENTIVE AGAINST OUTSTANDING EARS

An ear-pad arrangement, claimed to prevent any tendency to "outstanding ears," and designed to be worn by small children at night, may be found in any of the aid-to-beauty departments of English stores. The pressure of the caps against the ears, while practically imperceptible, is said to gently mold the cartilage of the ear while it is soft and pliable.

CONCRETE FOOTBALL COLISEUM FOR YALE

Yale University is to have a concrete coliseum for her football games that resembles a saucer in shape and will seat 60,000 persons, with the possibility of enlarging the capacity to 100,000 by widening the rim around the outer edge. The structure, which is of the semisunken type, the playing field being 25 ft. below and the outer edge 25 ft. above ground, will cost about $300,000.



Yale's Saucer-Like Football Coliseum Which will Seat 60,000 People

The outside of the embankment, which is steep, will be seeded to grass. The entrance to the seats will be through tunnels, running in level with the surrounding grounds like the spokes of a wheel and terminating in a wide circular aisle. The turreted entrance shown in the drawing leads to the playing field itself.

INSIGNIA OF THE FRENCH AERIAL CORPS

Corps badges have recently been designed for the aerial or "fourth arm" of the French army, the different badges indicating which branch of the aerial service, dirigible or aeroplane, the officers and men belong to, and the rank of the wearers. The insignia of the officer-pilots of aeroplanes and

dirigibles both consist of a golden wing embroidered on the collar of the uniform, but in front of the former is a star, while the latter is accompanied

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

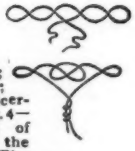


Fig. 8

Fig. 1—Officer-Pilot of Dirigible; Fig. 2—Officer-Pilot of Aeroplane; Fig. 3—Noncommissioned Officer-Pilot of Dirigible and Balloon; Fig. 4—Noncommissioned Officer-Pilot of Aeroplane; Fig. 5—Private of the Dirigible Branch of Aerial Corps; Fig. 6—Private of the Aeroplane Branch; Fig. 7—Special Mechanic; Fig. 8—Tailor and Cord Maker of Dirigible Branch of Service

by a steering wheel. The noncommissioned officer-pilots of dirigibles have a red and gold double wing, with anchor in the center, embroidered on the sleeve of the uniform, and the noncommissioned officer-pilots of the aeroplanes have the same device, excepting that the anchor gives place to a propeller. The insignia of the privates of either branch are exactly the same designs as those of the noncommissioned officers, but of red cloth, stamped out and sewed on the sleeve. The badges of the mechanics of the aeroplane branch, and of the tailors, cord makers, and the like, of the dirigible branch, are also shown in the illustrations.

¶Insurance bulletins assert that the cost of fires in the United States each year is one-half the cost of all the new buildings erected in a year.

ELECTRIC SPEED INDICATOR FOR VARIOUS MACHINES

An electric indicator for measuring the speed of vehicles and machinery in motion, is one of the new things. The apparatus consists of a magneto-generator and a direct-current measuring instrument so arranged that the recording part of the device may be operated at a distance, as for instance on the manager's desk. It is also possible to use this indicator for determining the speed of railroad trains and electric cars by attaching it to an axle. As a permanent record of the operation of the machine is obtained by means of a special recording device, it is claimed that the indicator is invaluable for testing the efficiency of machinery of all kinds.

TEACHING TABLE MANNERS BY MOVING PICTURES

Correct table manners are being taught the students of the University of Minnesota by means of moving pictures. The subjects flashed on the chapel screen include eight "perfect lady" students seated at a dining table and deporting themselves in a proper manner. The abuse of table etiquette is shown by pictures of eight other students conducting themselves in a manner indicative of ill-breeding.

CLAY CONDUITS FOR WINE CELLAR

Using clay conduits as receptacles for keeping wine in the walls of his new wine cellar is the novel use to which a wealthy wool merchant of Philadelphia has put about six hundred 12-in. lengths of clay tile. Each section of the tiling is about 1 ft. long and 4 in. wide, and will just accommodate a quart bottle.

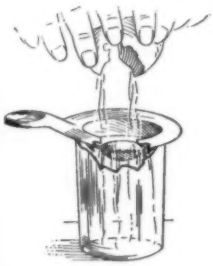
¶For several hours on the day before Christmas the Chicago telephone company handled 3,333 calls per minute, and 2,000,000 calls during the entire day.

FISH THAT CLIMB UP OCEAN TREES

A remarkably interesting species of the fish family that can climb up a tree, and which is known as the climbing perch, has been brought from India and placed on exhibition in the American Museum of Natural History. The fish is able to climb water grasses and trees under water by means of its tail, upon which it can stand erect and grasp the tree branches with the strong fins on its stomach.

AN EGG-SEPARATING UTENSIL

A sieve for separating the white and yolk of an egg is a recent German novelty for the household. In appearance like a tea strainer, the lower part of its bottom is hemispherical in shape and adapted to receive the yolk while the white is overflowing into the glass through two long slits just on the border of the hemispherical portion. It is, of course, necessary to remove the yolk from the sieve to another receptacle before another egg is treated.



SIDE SIGN ON STREET CAR GIVES COMPLETE ROUTE

An innovation in destination signs has been adopted for the street cars in Buffalo, N. Y.

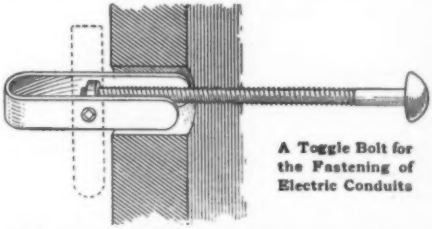
Heretofore these cars have had signs in front and on the side showing the route number and the terminal streets only. This was often confusing to strangers who wished to go to some street traversed by the car, and for this reason an enameled sign has been posted near the car entrance, giving the names of all streets over which the car runs, thus enabling passengers, desiring to reach any street on the line, to know at a glance which car to take.

Sign of Buffalo Street Car, Giving Complete Route in Both Directions

Philadelphia is arranging a similar system of signs, and Chicago has taken up the idea for its new near-stop cars.

HANDY FASTENER FOR ELECTRIC CONDUITS

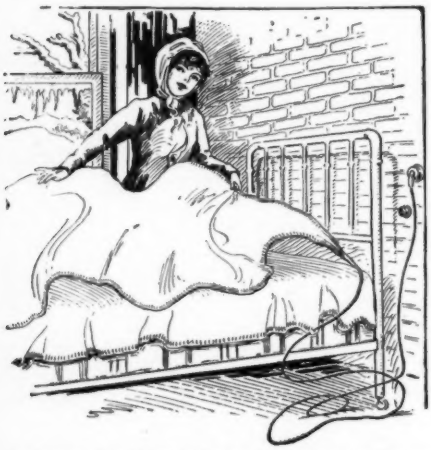
The fastening of electric conduits to plaster walls, ceilings, tiling, or any other form of hollow partition, is made easy by the use of this toggle bolt, especially designed for the purpose. The toggle bolt, with a readily adjustable hanger attached, may be inserted through a small round hole in a partition until the hanger, which is pivoted to the nut receiving the screw bolt, assumes the position indicated by the dotted lines, when the bolt may be tightened quickly with a screwdriver. In this way the surplus shank is left within the wall instead of protruding.



A Toggle Bolt for the Fastening of Electric Conduits

ELECTRIC BLANKET FOR PORCH SLEEPERS

Even the most enthusiastic believer in porch sleeping cannot deny that at least some discomfort attaches to the



An Electrically Heated Blanket for the Outdoor Sleeper

habit when the temperature is hovering around zero, and, certainly, one drawback is the weight of the covering required for warmth. By using an electric blanket of this type, however, the weight of the covering may be decreased materially. The electric blanket should be covered with a light-weight woolen blanket to keep in the heat. The bed may be warmed in advance by turning on the current 15 or 20 minutes before the bed is to be occupied.

RAILROAD PROGRESS IN THE UNITED STATES

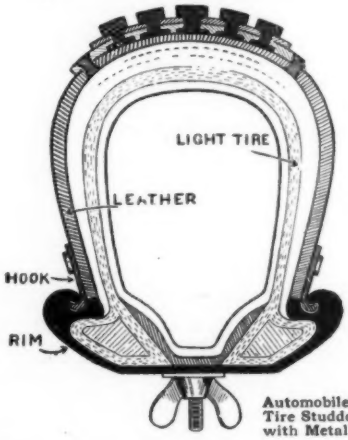
In 1912 there were built 2,997 miles of railroad in 41 states out of 46, and none in Alaska, according to the Railway Age Gazette. The longest mileage was constructed in North Dakota, where 347 miles of track were laid, while Texas ranks second with 336 miles. The new equipment ordered during 1912 includes 229,195 freight cars, 3,623 passenger cars, and 4,424 locomotives.

CITY WATER CROSSING A CANYON

The city water-supply system of Los Angeles, which, when completed, will be one of the two largest in the world, must cross a deep canyon. The bottom of this canyon is 455 ft. below the level of the conduit on either side. The enormous pressure under which the water is conducted, and the width of the gorge, 890 ft., made it impractical to carry the water straight across. The problem is being solved by driving an inclined shaft, 2,788 ft. long and 11 ft. in diameter, on either side and crossing the canyon 100 ft. below its bed, all the excavation being through solid rock. The siphon thus formed is similar in general plan to that of the New York City supply which will cross beneath the Hudson and deliver on the other side several hundred feet above the river.

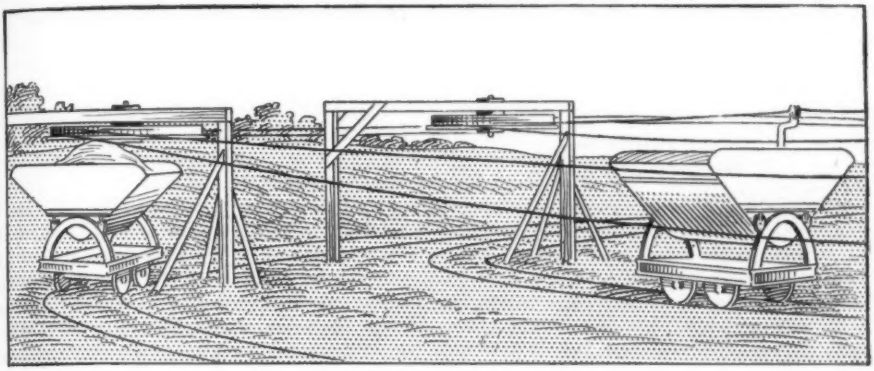
METAL-STUDDED LEATHER TREAD FOR TIRES

A leather cover for automobile tires, provided with a tread of studded metal, is being produced in England. The



Automobile Tire Studded with Metal

leather protector completely covers the special light tire used with it, and is held securely in place by means of a rim and attachments, as shown in the accompanying cross-section drawing.



Rope-Cable System for Hauling Clay

HAULING CLAY BY ROPE CABLE

A rope-haulage system, by which clay is brought in open cars from distant mines over tracks with sharp curves and up steep inclines to the brickworks without the cars having to be released from the cable, is in use at a Swedish brickyard. The illustration shows the general arrangement of this rope-haulage system, which is said to run more smoothly and lightly, to require less power for operating, and to be far more satisfactory in every way for long-distance hauling than the old-style chain systems. The chief improvement in the new system is secured by using rope instead of chain for a cable and attaching it to the box of the car instead of its truck, to prevent the cable from dragging upon the ground.

BIRDS AVOID HIGH-VOLTAGE WIRES

The leakage of electrical energy into the atmosphere from high-voltage wires is so strong that visual realization of its existence is often possible. Birds, for instance, never light, it is said, upon the wires carrying power from Niagara Falls to Syracuse and Rochester, N. Y. The birds approach, strike the area of tension and choose the near-by telegraph wires for an alighting place. The steam blowing over the power wires from locomotives begins to vibrate violently within a radius of 3 ft., or more, of the wires.

SKI SHOE WITH GROOVED HEEL FOR STRAP

A ski shoe with an improved heel is reproduced here. The grooved heel, suggested by an experienced ski runner, is for the purpose of holding the strap securely in position when the ski is fastened to the shoe. By this means the ski is still held closely to the heel, even when the straps stretch through

many hours of constant use or adjust themselves to the foot of the wearer when first attached.

¶An altitude record was established on December 11, 1912, when Roland Garros, a French aviator, at Tunis, reached a height of over 19,000 feet.

MOTOR AMBULANCE WITH SPIRAL-SPRING BED

One of the late types of motor ambulances has a bed mounted on spiral

A Motor Ambulance Having a Bed Equipped with Spiral-Spring Legs

springs that are said to do away with all vibration effects. The bed can be lifted from its framework and springs for use as a stretcher in carrying the patient to and from the ambulance.

AERODYNAMIC LABORATORY FOR UNITED STATES

Definite steps have at last been taken which practically insure for this country what it has long required, and other countries already have—a national laboratory of aerodynamics. The laboratory will probably be located in Washington and will include a large outdoor aerodrome. The location is good, affording both excellent land and water areas, and favorable weather most of the year. Here will be provided not only literature and models for study, but the necessary apparatus for testing undeveloped plans and theories, something not to be found in this country at present. It will doubtless greatly stimulate, as it will certainly make possible, progress in the art. President Taft has appointed a strong commission of well-known men in science, engineering and the army, including that earnest worker for the laboratory, Doctor Zahm.

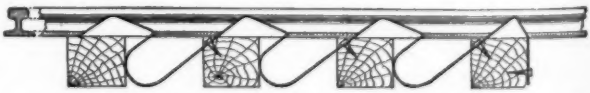
FRONT-WHEEL STANDS FOR MOTORCYCLES

This drawing shows a stand attachment for the front wheel of a motorcycle, its purpose being to facilitate repairs on the wheel or tire. It slips up over the tail of the mudguard when not in use and is held securely in this position by a clasp.

¶ The proper care and treatment of dumb animals is being taught theater goers and school children in Massachusetts by displaying moving pictures that show both humane and cruel methods of treatment.

CATTLE GUARDS FOR LEVEL CROSSINGS

Ingenious metal cattle guards, designed for use at level crossings to prevent cattle from straying onto the line, have been adopted by several railways in India. The guards are made of ⅛-in. sheet steel, pressed into peculiar sloping corrugations, which absolutely prevent cattle from walking over them. These are laid for a distance of 7 ft. on each side of the crossing.



Corrugated Cattle Guards Which Prevent Cattle from Straying onto the Railroad Line from Level Crossings

MAKING COTTON OR WOOL LOOK LIKE SILK

A new method of making cotton and woolen goods look like real silk consists of dipping these materials in a solution made in the following manner: Raw silk is first treated with lye for from two to 10 hours, and then the excess of liquid is pressed out, leaving a quantity of lye at least equal to the silk in weight. This product is mangled and placed in carbon bisulphide for two hours, after which it is dissolved in water. Cotton and woolen goods soaked in this liquid and dried have the appearance of silk.

GERMS OF DISEASE KEPT ALWAYS ON HAND

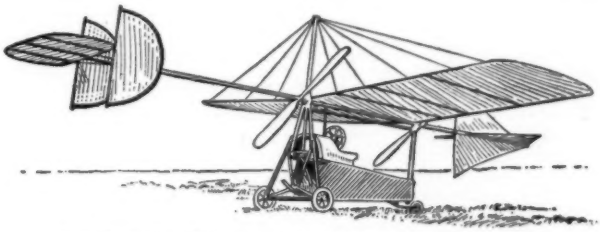
The American Museum of New York City has been made a central bureau for the preservation and distribution of disease germs of all kinds, especially those of new forms and varieties. The museum has also sent requests to the various institutions for culture existing through the United States, Canada, and abroad, for different bacteria, which it proposes to develop and keep on hand for the purpose of advancing the study of disease and its cure.

WIRELESS TRANSMITS HUMAN VOICE

On a recent voyage from Panama to San Francisco, the Marconi operators on the Pacific mail liner "San Jose" report having distinctly heard a conversation which was being carried on in a test of wireless telephone between Santa Catalina Island and the mainland. The ship was fully 150 miles distant. Not only was the conversation audible, but music from a phonograph was distinguished, including pieces of popular ragtime.

TAIL-FIRST MONOPLANE FLIES SUCCESSFULLY

A Roumanian aeroplane of unusual construction, which has made several

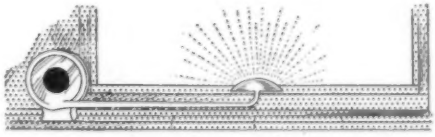


Tail-First Monoplane Invented and Flown by a Roumanian

successful flights at Vienna, is here shown. It is a monoplane of what is called the "tail-first" type, but it also carries triangular tail planes at the rear. Another unusual feature is the arrangement of the two propellers, one in front of the planes and the other behind. The motor and the seat of the airman are hung rather low.

ANTISTEAMING DEVICE FOR STORE WINDOWS

A simple but very effective device for preventing the steaming or fogging of store windows during cold weather has been invented, and is being installed by shopkeepers. The invention consists of a short nozzle, shaped like a fan and fastened in an upright position to the end of a pipe which extends along the bottom of the window on the inside. Through this nozzle, which is provided with a number of small holes, a strong current of dry air is forced over the surface of the window by



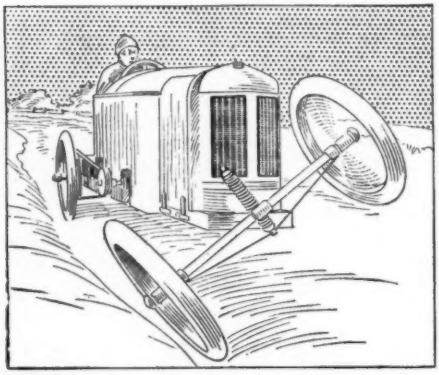
Device to Prevent Steaming of Shop Windows

means of a blower attached to an electric motor, thus preventing entirely the gathering of moisture upon the glass. This nozzle, which can scarce-

ly be seen from the outside of the window, is finished in silver, gilt or bronze, and the motor can be operated from any lighting circuit.

MOTORETTE HAS UNUSUAL AXLE MOUNTING

The latest motorettes or small automobiles of what is called the "Bedelia" type, which are steadily growing in popularity in Europe, have a front axle mounted with a universal joint, which is claimed to prevent shocks being transmitted to the chassis through the front wheels, however rough the road may be. The illustration shows one of the wheels raised upon striking a bump until the tire almost touches the radiator, yet the chassis remains perfectly horizontal. The rise and fall of the axle as a whole takes place against the compression of the coil spring mounted on the steering bolt. If only one wheel meets with an obstacle, the whole axle turns, and the coil spring is not compressed.



An Automobile with Ingenious Front-Axle Mounting

AIR CRAFT AS TARGETS FOR HEAVY GUNS

As the striking of air craft in motion with a projectile requires quite a special training, a study of possible methods of using air craft as targets for artillery and rifle practice was recently made by some British officers. It was found that experience could be gained by firing against kites suspended above cruisers if the vessel's pace could be increased sufficiently to keep the kites in the air. It is claimed, however, that this difficulty could be overcome by using small motorboats or water planes, as they are more speedy than the cruisers. When the target was attached to a float towed by the ship, it was discovered that the strain on the float was so great that no practice of appreciable value could be gained in this manner. Another suggestion was using a target, somewhat like a dirigible balloon and towed by a dirigible, or one similar in construction to an aeroplane and towed by an aeroplane, while the alternative consisted of air-craft targets that were controlled by wireless apparatus on shore. It was agreed that the only type of aeroplane suitable for the purpose of towing a target was that having the propeller in front of the machine. In using the dirigible as a target, the difficulty to be encountered was in attaching the cable to the car of the dirigible that did the towing. Steering a dirigible or an aeroplane target from a wireless control on shore presented no serious difficulty, but the cost of the necessary shore apparatus would be prohibitive in conducting tests on a large scale, besides the targets could not be recovered, whether they had or had not been hit. It was believed that the risk an aeroplane ran, when towing a target, was practically none; and, incidentally, it was agreed that the amount of vulnerable surface of any aeroplane in war, exposed to fire, was about one per cent of the area of the aeroplane. For this reason it was claimed that the target might be hit many times without doing any great amount of damage, and that the pilot could safely descend to the ground within his own lines even if the propeller were struck by the projectile. Tests with a high-power automobile towing a target on land disclosed the fact that it was possible to attain a speed of only 30 miles an hour, or

about half that of an ordinary aeroplane and two-thirds that of a dirigible at full speed. The plan of adjusting an aeroplane without an aviator and permitting it to fly over a certain distance was considered as being too costly, as the air craft undoubtedly would be lost or destroyed.

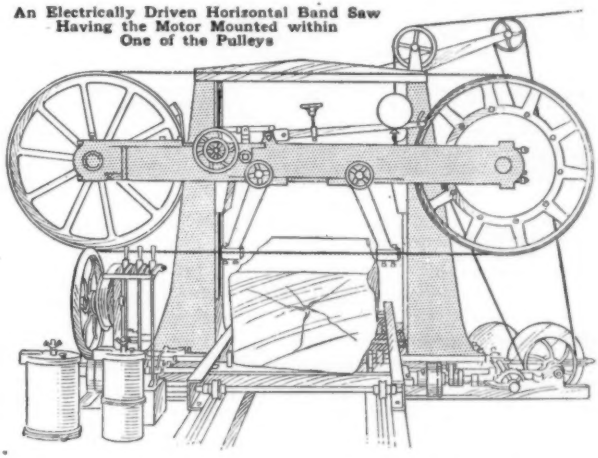
TOWN DEBTS WILL RUN TWO CENTURIES

Before the towns of Morrisania, West Farms and Yonkers, N. Y., were made a part of the city of New York, each of them was, by a special act, authorized to raise by loan the sums of $3,500, $6,500 and $2,500, respectively, the money to be used for improving the streets. The act provided that each town should issue bonds for the amount required to meet the cost of that part of the improvement within the limits of the town, and that these bonds "shall bear an interest of seven per cent per annum, payable annually, and that they shall be so drawn as to become due in sums not exceeding $1,000 in any one year." At this rate the bonds doubtless would have been paid for as they fell due, had the law not been amended in 1868 by substituting for the sums named as the amounts to be raised in each town the words, "such sums as may be necessary." The town of West Farms, now a part of New York City, accordingly issued seven per cent bonds to the amount of $112,500; Morrisania, also now a part of New York City, issued bonds to the amount of $278,000, the last of which is payable in the year 2147. Therefore, instead of the original sum of $10,000, which these two towns were authorized to borrow and pay off within a few years, an actual debt of $390,500 was made, which will not be entirely paid by New York City for 235 years.

HORIZONTAL BAND SAW WITH MOTOR IN PULLEY

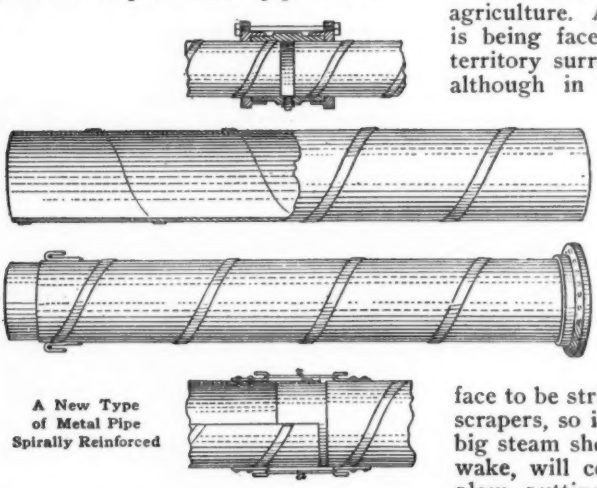
The placing of the motor within the wheel of the electric motor truck is a practice now quite general in electric vehicle propulsion, and that the same idea is being applied to other mechanisms is shown in the accompanying illustration of a new type of electrically driven horizontal band saw. The motor is within the saw pulley at the right. The rising and falling of the saw is easily effected, as the current is fed to the motor through flexible wiring from above, and enters the motor through the partially hollow shaft. The armature of the motor is stationary, the field revolving around it and carrying the saw pulley. By this mounting, a flywheel effect is produced, which is claimed to give the best possible results in band-sawing, while at the same time reducing the amount of power required. The pulley-contained motor, of course, only drives the band saw, the rising and falling of the frame being worked separately by means of a small motor.

An Electrically Driven Horizontal Band Saw Having the Motor Mounted within One of the Pulleys



REINFORCED SPIRAL METAL PIPE

Great strength, considering its lightness, is claimed for the new type of reinforced spiral metal pipe shown in



A New Type of Metal Pipe Spirally Reinforced

the accompanying illustration. The pipe is made of two strips of steel of different widths, having a continuous interlocking seam, which at the same time forms a reinforcing band wound spirally around the outside of the pipe. The pipe is smooth on the inside, there being no rivet heads, and all flanges and other connections at the end are welded to the pipe. By reason of the spiral winding of the sheets in forming the pipe, and the absence of any occasion for punching, the metal retains its maximum strength, and lighter gauges than are possible for the same pressure with other forms of pipe can be used. Bursting tests made on this type of pipe showed a hydraulic pressure of 235 lb. was necessary to burst the seam of an 18-in. test section.

¶Canadian automobile tourists have succeeded in motoring from the Atlantic to the Pacific in 49 days elapsed time. The exact running time was 41 days and the number of miles traversed was 3,900, making an average of 95.13 miles covered per day.

STEAM-SHOVEL COAL MINING CLEARS WAY FOR CROPS

In the early days of the white man in this country, land had to be cleared of trees before it became available for agriculture. A not dissimilar condition is being faced by the people in the territory surrounding Pittsburg, Kan., although in this instance it is not growing forests, but coal that is to be cleared away. The whole of this part of Kansas is underlaid with a vein of coal, 3 to 4 ft. thick, at a depth of from 20 to 30 ft. This is too close to the surface to be mined in the ordinary way, and too far from the surface to be stripped with ordinary horse scrapers, so it is being excavated with big steam shovels. Following in their wake, will come the farmer with his plow, putting in crops on land which was practically worthless for agricultural purposes before the removal of the coal. Thus several million tons of coal is being added to the available supply of Kansas and many valuable acres of agricultural land.

SEAT AND BACK REST FOR MOTORCYCLES

The diagram shows an interesting combination of seat and back rest used on a motorcycle during a speed contest. The seat and back are made from one piece of metal and mounted upon a pivoted device, to which is attached a spring in such manner that the back is movable instead of rigidly fixed.

IMPRESSIONS OF BALLOONIST LEARNING TO FLY

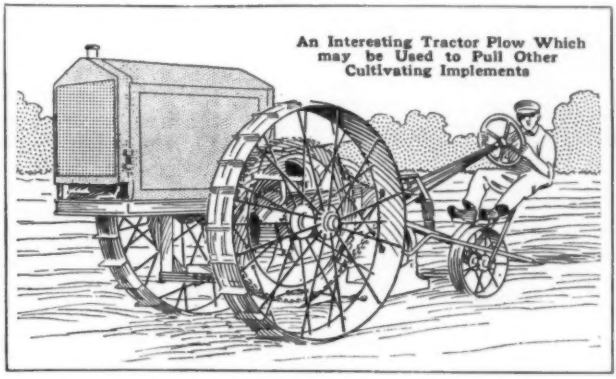
Mention has been made before in this magazine of the fact that Vincent P. Taylor (Captain Penfold), the Australian aeronaut, has given up the balloon in favor of the aeroplane. His impressions are particularly interesting in that they come not from a man to whom air navigation is a new experience, but from a man who has changed to a new type of craft.

"I am improving with every trip up," says Mr. Taylor, who has since received his pilot's license, "and find there are lots of things in the air you cannot see that give you a bump or a drop now and again. Sometimes you can anticipate them. The sun coming out makes eddies, the air rising in places. You also have to watch the direction the wind is blowing, so as to look out for its bumping you as it comes over the trees, should you be approaching the trees from the leeward side. One of my new experiences came through letting a monoplane pass in front of me, and, although I crossed behind it at a good distance, my aeroplane got a knock. This was due to the backwash of air from the monoplane's propeller, similar to the backwash of water after a steamer has passed.

"Another thing the beginner should bear in mind is that an aeroplane driven by a Gnome engine, which is the type most generally used in Europe, has a tendency to fly downward when making a left turn, while, on a right-hand turn, it will attempt to rise. The machine should be headed slightly up in the first instance, and down in the second, otherwise there is danger. There is likewise much danger in attempting to climb too quickly, as the machine will lose speed."

BIG-WHEEL-DRIVE FARM TRACTOR

A small type, three-wheeled farm tractor, having several interesting features, is here shown. The two front wheels, which are 5 ft. high, with 10-in. faces, are the drive wheels. The rear wheel is but 2 ft. in diameter, and over it is mounted the operator's seat. The machine was constructed primarily as an auto plow, but, with the plows removed, or out of working position, it proves to be an excellent one-man tractor as well. It can, for instance, be operated from the seat of a binder, thus making possible the handling of the two machines by one man.



An Interesting Tractor Plow Which may be Used to Pull Other Cultivating Implements

OIL FIELDS FOUND BY DRINKING TEA

The discovery of oil in Papua, British New Guinea, was the result of a native boy being whipped for placing kerosene in a miner's tea. The youth declared his innocence and led the miner to the well from which the water had been taken. It was found that the surface of the water was completely covered with kerosene, the source of which is being developed into a huge commercial enterprise.

¶A new building is completed in New York City every 59 minutes.

ROLLER SKATING AS AN AEROPLANE

Roller skating is a more or less fashionable pastime in London and the carnivals held each year are remarkable for the ingenuity of fancy-dress and novelty costumes devised by the participants. The winner of the second prize in a recent carnival imitated an airman, seated in a biplane in the position of the pilot. "Dummy" legs were required to carry out the imitation, the effect being ludicrous.

HYDRAULIC TRANSMISSION FOR AUTOS

A wild dream of taxicab rides as cheap as cigars comes from New York, where an inventor announces he hopes to soon perfect a new form of transmission which will effect a great saving in power. He will use the same engines, body, and wheels as at present, but instead of gears and varied speed levers, he expects to transmit his power by a hydraulic system in which oil is pumped by the engine to a sort of turbine attached to the rear axle.

Entire control would rest with one lever which regulates the flow of the oil: the more oil the greater speed; shutting off the oil acts as a brake. He also proposes to build cabs to accommodate only two passengers, and weighing only 1,500 lb., a scheme not unlikely to receive more attention as the price of gasoline advances.

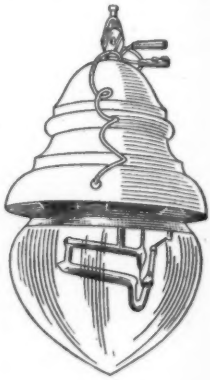
A SCHOOL FOR MOTORBOAT "CHAUFFEURS"

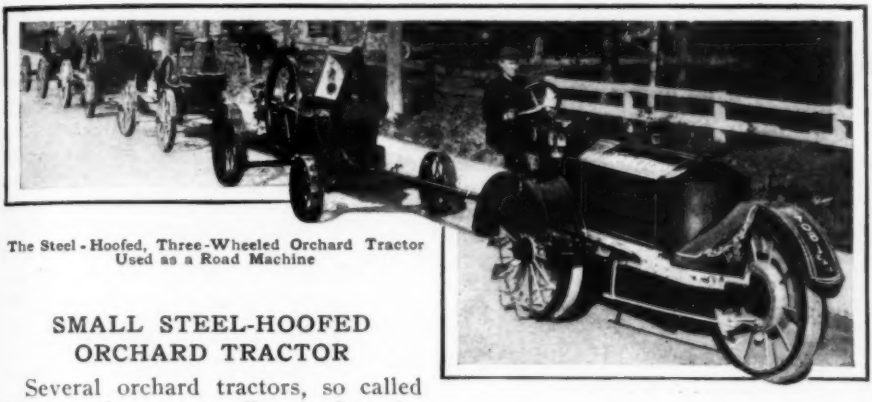
The difficulty in finding men who are sufficiently familiar with both "the ways of the sea" and the ways of gasoline engines has caused the Royal Motor Yacht Club, England, to organize a school to teach yacht hands to be motor engineers as well. The ordinary mechanic has no experience of the sea or of the handling of boats, so is practically unfit for a boating position without a year or two of water training. On the other hand, it does not take as long to instill a knowledge of the workings of a gasoline engine into a seaman.

The course of study in the school will consist of a series of eight lectures, illustrating working parts, and practical demonstrations with the club's launches.

QUARTZ-TUBE MERCURY-VAPOR LAMP

A quartz-tube lamp having only one mercury electrode is shown in the accompanying illustration. In former designs of quartz lamps, two mercury electrodes were used, and this led to serious trouble, owing to the fact that the mercury volatilizes at the anode, the electrode from which the arc originates, more rapidly than at the cathode, on the other side of the spark gap, making it necessary for mercury to drop back from the latter, through the arc, to equalize the mercury levels at the two electrodes. By the use of a solid anode, the use of all sorts of heat-dissipating devices required to equalize the mercury levels is done away with.





The Steel-Hoofed, Three-Wheeled Orchard Tractor Used as a Road Machine

SMALL STEEL-HOOFED ORCHARD TRACTOR

Several orchard tractors, so called because they are small enough to be operated in orchards without damaging low-hanging limbs, have been illustrated, from time to time, in this magazine. The particular feature of this little three-wheeled tractor is the steel hoofs or cleats attached to the rear wheels. These engage loose earth in much the same manner as a horse's hoof, thus giving the machine more tractive power in loose, loamy soil.

The tractor is as available for road work as in land cultivation. On roads and paved streets the weight is carried on the tires, the hoofs only coming in contact when a stretch of soft road is encountered.

DESIGNS AEROPLANE FROM CIGAR SMOKE

Rowland King, an associate of Grahame-White, declares he secured his ideas for an aeroplane of new design from hours spent in studying the action of cigar smoke. Later he provided a special apparatus which produced smoke continuously and in greater quantities. Not only was the effect noted of smoke driven against different objects, but it was watched as it made visible air currents which could not otherwise be seen. The new machine will have only 35 hp., but is expected to make 60 miles an hour, and it is hoped a new muffler will make the exhaust from the engines inaudible at a distance of a few hundred feet.

CURB TELEPHONES FOR THE CALLING OF TAXICABS

A curb-telephone system has been installed in Hamburg, Germany, for the calling of taxicabs. The telephone boxes, which are of a somewhat weird design, are placed close to the curb at the cab stands and at places where taxicabs are most liable to be called. These telephones are all connected up

One of the Curb Telephones Installed for the Calling of Taxicabs

to the central office of the taxicab company, and anyone wishing a cab has only to push a button, according to directions on the face of the box, and speak his desire. These phones are of the loud-speaking type, so that, when the operator in the taxicab office wishes to give instructions to one of the chauffeurs waiting at a cab stand, all he or she has to do is to call through the phone. The call can be heard above the din of the ordinary street traffic and for a considerable distance.

A CASH BOX THAT IS BURGLAR-PROOF

This ingenious burglar-proof cash box is made of steel and fitted at the base with a small dry battery and mechanism which starts an alarm bell ringing when the box is lifted or even slightly shifted. The alarm, which is sufficiently loud to attract attention, will continue to sound for six hours unless shut off by the owner, who alone knows the method of its setting.

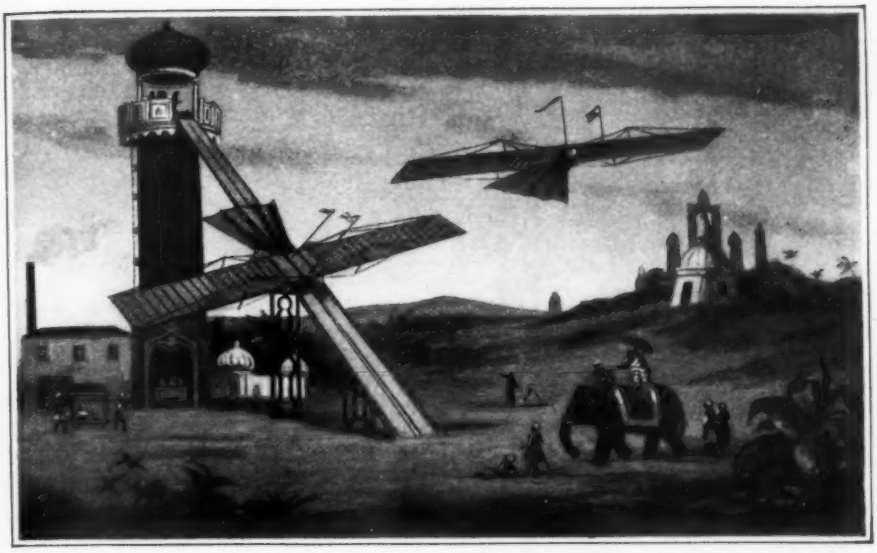
LIGHTHOUSE THAT LURES BIRDS TO DEATH

A lighthouse in Brittany lures thousands of birds of all kinds to their death every night, especially during the month of November, by means of its 30,000,000-cp. light, according to an observer who saw swarms of these migrants whirling around the beacon, which seemed to shoot out a perfect hail of electric sparks among them. He was present one morning when the dead bodies were being collected for shipment to Paris and was informed that the nightly "catch" comprised from 2,000 to 4,000 victims, mostly game birds.

WILD DEER WRECKS AUTOMOBILE

An unusual automobile accident is shown in this illustration. A small runabout, running at a speed of about 20 miles an hour near Newcomb, N. Y., struck a deer which tried to cross the road in front of it. The collision killed the animal and swerved the machine into the gully. Then the gasoline exploded and set fire to the machine. The occupants of the machine were only slightly injured.

A Tragedy for Both the Automobile and the Deer



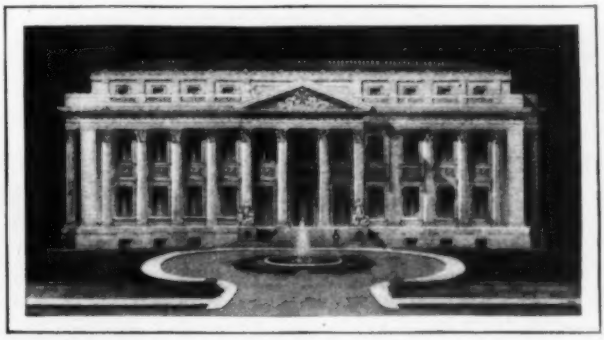
Reproduction of a colored print, published in 1842, probably for promotion purposes, as it represents a station in India on a proposed world circuit. It shows how the English inventor Henson, who in that year built and patented the monoplane depicted, proposed to launch his flying machine and to carry passengers and mail. The monoplane never flew, however, but is interesting for its similarity to successful modern machines of this type. One recent writer says of it that it "embodied a large proportion of the features since proved needful, and turned out a failure more because it was too much in advance of its time than for any other single reason."

SEVEN LARGEST DYNAMOS IN THE WORLD

The seven largest direct-current dynamos in the world are being constructed and will be installed in an aluminum plant at Whitney, N. C. Each of these immense generators is 22 ft. in diameter, has a height of 13 ft. above the floor level, and will weigh about 150 tons. The giant machines will be installed immediately over water pits and direct-connected to vertical shafts of water turbines, which will furnish the driving power. Each of the generators has been designed with a rated capacity of 5,000 kilowatts, at 20,000 amperes and 250 volts.

PROPOSED RED CROSS BUILDING

Although some alterations in tne plans may be made before erection, the proposed American Red Cross building for Washington, D. C., will, in the main, appear as shown in this illustration.

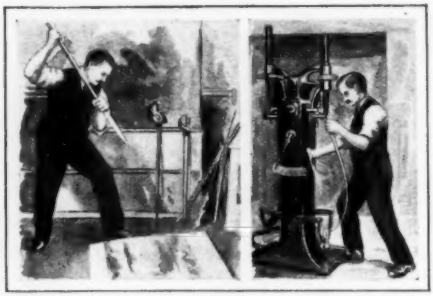


The Red Cross Building to be Erected at the Expense of the Government in Washington

As yet the House of Representatives has not passed the appropriation for its construction, although the Senate has done so, and the House Committee on Public Buildings and Grounds has approved it.

"PROVING" THE SWORDS OF ARMY OFFICERS

The swords used by army officers are as carefully tested today as in the days when war was practically a man-to-man combat and the sword the all-important weapon. Besides the Toledo proof of thrusting them against solid iron and piercing an iron plate, the swords of British officers are subjected to a machine which tests the vertical strength, strikes a blow of 400 lb. to discover flaws in the metal, and also bends the blade to prove its temper. If a sword does not regain its shape and rigidity after the severe bending, it is rejected.



Courtesy The Graphic, London

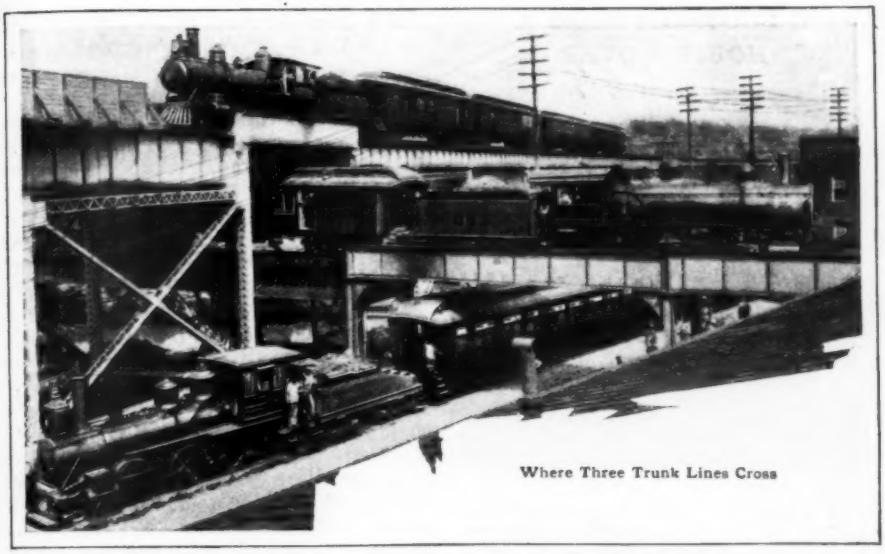
Testing the Point of a Sword by Thrusting It through a Sheet of Iron — Sword being Bent by a Machine to Prove Its Temper

MARTELLO TOWERS—RELICS OF EARLY DAYS

Along the Canadian boundary line between the provinces of Ontario and Quebec and the United States may be seen, here and there, queer little stone towers, that have evidently survived their usefulness, if, indeed, they ever possessed any. Some of them have been utilized as the base for a lighthouse, when the location was suitable, and others have apparently at some period been converted into windmills. They look at a distance like huge railroad water tanks with their underpinning removed and resting flat on the ground, although occasionally one like that at Kingston, Ont., is built in the water of the harbor. They are nowhere seen in the United States.

These Martello towers are round towers built originally for coast defense by Great Britain, though some are still seen in the interior of Canada along the southern border and on some large rivers, which are said to have been built just before the war of 1813. They occur in several places around the coast of the United Kingdom, but principally opposite the French coast, along the southern shore of Kent and Sussex, where for many miles they are within easy range of each other. On this continent they were mostly erected during the French War as a defense against invasion. They are built of stone, about 30 ft. high and 18 to 24 ft. in diameter. The walls are from 3 to 5 ft. in thickness, and pierced for musketry in their interior. They are in two compartments, one above the other; the lower one, being the base, was used for the storage of ammunition and provisions, while in the upper there was room for 20 or 30 persons in defending the stronghold. The roof was generally flat and there a swiveled

Martello Towers at Kingston, Ont.



Where Three Trunk Lines Cross

heavy gun was mounted to command shipping. There were a number of these small forts built along the boundary line between the United States and Canada prior to the war. At Kingston, the principal fortified town in Canada west of Quebec, there are five of these towers along the St. Lawrence River and in the harbor within easy range of each other. They are not occupied, nor does the oldest resident of the place remember when they were garrisoned.

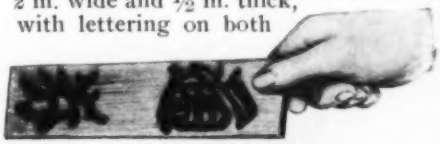
The name of these towers is said to be taken from Italian towers built near the sea, during the period when piracy was common in the Mediterranean, for the purpose of keeping watch and giving warning of the approach of a pirate ship. The warning was given by striking on a bell with a hammer (Italian *martello*), and hence these towers received their name. They are far more fit for this purpose than for towers of defense, except in cases of Indian attacks—for they would not withstand any cannonading. One of these towers is in the harbor of St. John, N. B.; two or three are to be seen in Montreal, and one in Quebec. Wherever they are seen, they are all alike in appearance and of about the same size.

TRIPLE RAILROAD CROSSING

As one approaches Richmond, Va., this crossing of three trunk lines of railroad may often be seen as shown in the illustration. The Chesapeake and Ohio crosses from north to south on the uppermost bridge; the Seaboard crosses from east to west on the middle deck, and the Southern Railway runs south on the surface.

JAPANESE THEATER TICKETS

The Japanese theater tickets are made of pine wood about 10 in. long, 2 in. wide and ½ in. thick, with lettering on both



Ticket for Japanese Theater

sides. They are sold for nine sen, or 4½ cents each, and another sen is charged for taking care of the patron's street shoes, as they are not worn indoors.

¶An automatic indicator for motor cars shows the grade of a hill in feet and inches.

A LOCOMOTIVE AS A HOUSE MOVER

An engineer on the Chicago and Northwestern Railroad acquired a house in Ashland, Wis., and a site

Locomotive Moves a House Down a Railroad's Right of Way

upon which to locate it about a mile outside the city's limits along the right of way of the railroad. The problem of how to get the house to the site was solved by mounting it on trucks, harnessing a locomotive to it, and laying planks alongside the rails for the trucks to run upon.

MACHINE SHOVEL ON A MOTOR TRUCK

A small machine shovel mounted on an auto truck for industries that cannot economically use a large steam shovel has been brought out. The shovel is caused to make practically the same motions as if it were handled by a man, being first pushed forward into a heap of coal, for instance, then

Motor-Car Machine Shovel for Small Operations

lifted and thrown backward so that its load falls into the lower end of the receptacle on the truck, whence it is conveyed by a bucket chain to the top and dumped through a chute into the wagon or freight car. A gasoline engine furnishes the power for the shovel as well as for the truck itself, but, where convenient, an electric motor fed by a flexible cable from some source of energy could also be used. The shovel has a long range of forward motion, so that a wide strip of a coal heap can be handled in one run of the truck along its edge.

AN AEROPLANE THAT FLIES "LENGTHWISE"

A positive reverse in aeroplane design is shown by a machine that has flown with considerable success at Berlin. While all other aeroplanes of

A Revolutionary Change in Aeroplane Construction: a Machine That Flies Lengthwise

the kite or wing type fly with the greatest width of the planes presented to the air's opposition, this machine flies lengthwise, having comparatively short transversal planes. The construction of this particular aeroplane is claimed to make side-tilting impossible, and also offers greater possibilities for high speed, as less frontage is presented to the wind.

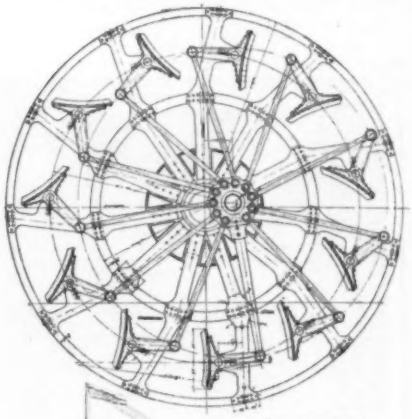
¶The United States government has passed a law prohibiting the use of "any drinking cup, glass or vessel for common use" on all trains, vessels and other conveyances used in interstate commerce, and in all depots and waiting rooms of common carriers.

MAKING HIGH EXPLOSIVES LESS DANGEROUS

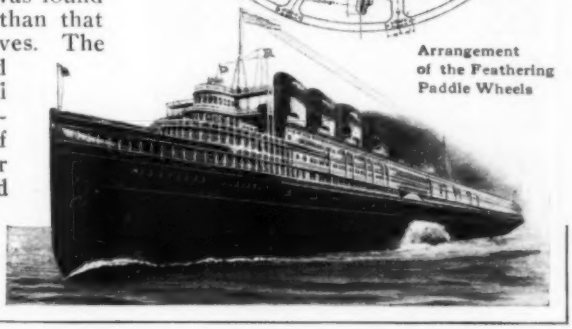
Some experiments with high explosives, the basic part of which is oxygen in a liquid form, are being conducted by military authorities abroad. In endeavoring to solve the problem of making with liquid oxygen a mine explosive that will not give off dangerous or obnoxious gases, which usually are produced when the regular mine explosives are used, it was discovered that a mixture of aluminum powder and liquid air almost gave the desired result. The gas produced by an explosion from this combination, although not quite harmless, was found to be much less dangerous than that developed by other explosives. The new explosive also produced an effect twice as powerful as an equal weight of blasting powder. A mixture of carbon powder and liquid air was also tried and found as powerful as dynamite. This is indeed remarkable from an economical point of view, as the material costs but very little where hydroelectric power is available. The experiments will be continued with the hope that a more practical form of the new explosive will be found than has been developed up to the present time.

LARGEST SIDE-WHEELER IN THE WORLD

The new side-wheel steamer "Seeandbee," which will be placed in service between Cleveland and Buffalo this year, will be the largest and most luxurious passenger steamer on the Great Lakes and the largest side-wheeler in the world. The length on deck will be 500 ft., and the breadth on deck 96½ ft. The main propelling engines, which are of 12,000 hp., will drive feathering paddle wheels 32 ft. in diameter. These wheels, turning at only 30 revolutions per minute, will drive the vessel at a speed of 22 miles an hour. The reason why side-wheel propulsion is adopted for such a large ship is that this system affords the maximum comfort for the passengers, the vibration being negligible.



Arrangement of the Feathering Paddle Wheels



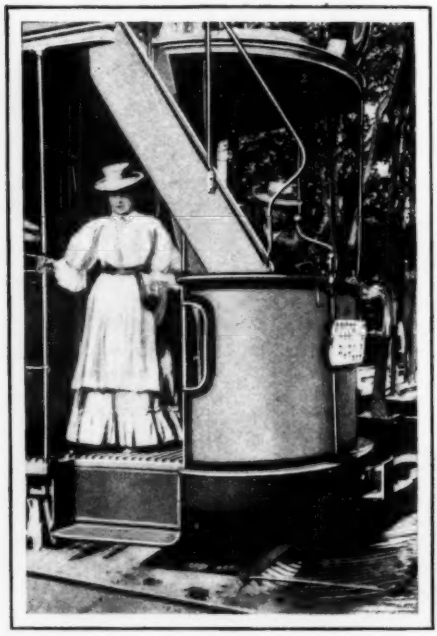
The 500-Ft. Side-Wheeler "Seeandbee," to be Placed in Lake Service This Year between Cleveland and Buffalo

The "Seeandbee" has stateroom accommodation for 1,500 passengers, and will have a government permit to carry about 6,000.

WOMAN STREET-CAR CONDUCTORS

The possibility that women may be employed as street-car conductors in Philadelphia, so as to effect a wage saving, draws attention to the fact that the women of Latin America, usually thought of as sheltered, modest, retired and unprogressive, have been doing this kind of work for years. Ever since the war between Chile and

Peru, when all the men of Chile were needed at the front, and women took their places on the street cars to tide over the emergency, Santiago, Valparaiso, Concepcion, and several other cities, have had women street-car conductors.



A Woman Street-Car Conductor of Valparaiso, Chile

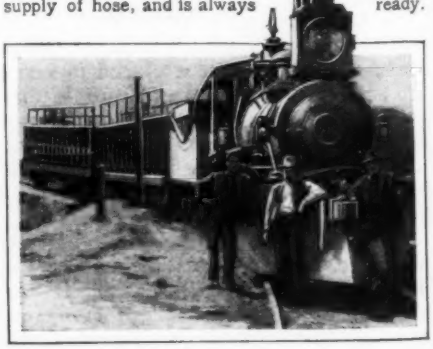
EXCEPTIONALLY SENSITIVE THERMOSTAT

A new thermostat, found useful in testing watch movements, and in various laboratory processes where a constant temperature is essential, is claimed to be so sensitive that it will respond to temperature variations of only a fraction of 1 deg. F. Its action depends upon the bulging out or contraction of the walls of a hollow disk filled with an exceptionally volatile liquid. The slightest change in heat changes the gas pressure in the disk, bulging or contracting its side, the action of the latter closing or opening an electrical contact in the usual manner.

HUNDRED-MILE NON-OILING MOTORCYCLE TEST

Although the ordinary motorcycle rider lubricates his machine at least once in 10 miles, and an attempt to ride five or six times that distance without oiling might be considered ridiculous, an English motorcyclist recently carried out a 100-mile non-oiling test with success. Before starting, five charges of oil were forced into the crankshaft, then the oil pipe was disconnected from the tank and the contents of the latter removed. During the first few miles many stops had to be made to clean the spark plugs, the five charges of oil being too strenuous for the beginning of the trip. It took 55 minutes to cover the first twelve miles, but the average speed maintained thereafter was 18 miles an hour. After the spark-plug trouble of the first 12 miles, the trip was carried through without trouble of any kind, there being not as much as a murmur from the engine. At the end of the trip the exhaust was as healthy as ever, the outside of the engine was spotless, there was no sign of oil leakage at any joint, nor any rattle or squeak. The oil, of which there was half a tumbler left in the crankshaft, had not even turned black, or become thinner, as might be expected under such severe conditions.

Fire train used by Southern Pacific Railroad to fight forest fires. The locomotive has a scoop-shaped pilot for pushing debris off the track; draws two large water-tank cars; carries a supply of hose, and is always ready.



GROWING LETTUCE BY ELECTRIC LIGHT

Forcing lettuce by means of electric illumination is said to be so successful in this hothouse that four crops are now grown where only three were previously produced. The illumination that turns night into day, so far as the lettuce is concerned, at least, is provided by eight 2,000-cp. flaming arcs, which are turned on as soon as the sun goes down.

By Electrically Illuminating This Hothouse by Night Four Crops are Grown Where Only Three were Previously Produced

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¶F. C. Schiller writes from Cordova, Alaska, to correct the recent statement that the most northerly electric-light plant is in Newfoundland. He states there are 14 plants from 600 to 1,000 miles farther north.

A TELEPHONE FOR MOTOR VEHICLES

An automobile telephone, known as the landophone and designed for use in communication between the occupants of a car and the chauffeur, is being manufactured in England. The device, which in reality is nothing more than a loud-speaking telephone, consists of a transmitter fastened to the interior of the car by a special hook to prevent vibration, and a trumpetlike receiver placed on the outside in such manner that the driver can hear all spoken words without turning his head.

The apparatus is easily installed and connection is established by simply pressing a button during the conversation.

SOCIETY GIRLS HELP DIG A BASEMENT

Because there were no funds to excavate for a basement room to their church, Rev. E. R. Waring, pastor of the Cleves, Ohio, Methodist church, did the work himself, assisted by the whole congregation which took turns at the pick and shovel. Even the girls of the church, members of well-to-do families, who never think of even washing dishes at home, helped for the novelty of the thing.

Digging the Church Basement—The Man at the Wheelbarrow is the Minister

The excavation work is now done and the basement room will be used as a social center and a branch of the Young Men's Christian Association.

DUPLICATE LEVERS FOR AEROPLANE STUDENTS

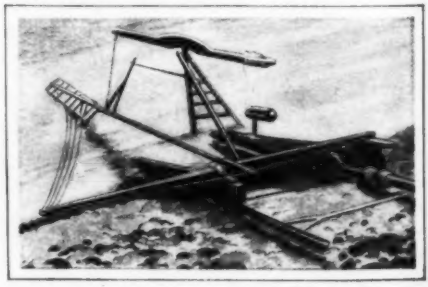
A system of control levers for aeroplanes, used for the instruction of prospective airmen, has been recently patented in France. It consists of two levers so connected that the lever held by the student can follow the movements of the pilot's lever, while, at the same time, should the student operate his lever in an incorrect manner, it becomes instantly disconnected. Thus, it is claimed, the student may easier learn the proper handling of the aeroplane in flight.

AN ARTIFICIAL FISH THAT SWIMS

The means by which an artificial fish is made to swim in a glass globe filled with water is interesting. Attached to the under side of the imitation fish is a glass tube terminating inside the fish in a metal disk over which is stretched a rubber membrane. The neck of the globe, which is placed upside down on a stand, is closed by a flexible membrane held in place by a cork. By means of a small lever, connected with the flexible membrane, pressure may be exerted on the water, and this pressure forces water through the tube into the fish, causing it to descend in the same manner that a submarine is caused to descend by the taking in of water ballast. When the pressure is released the water streams out, propelling the fish forward in an ascending course.

WATER-CURRENT MOTOR

A new type of water-current motor is being demonstrated in Washington, for irrigation purposes, and is reported to be lifting water 100 ft. in a continuously satisfactory manner. Power is secured by a large paddle which automatically drops into the



Current Motor for Pumping Water

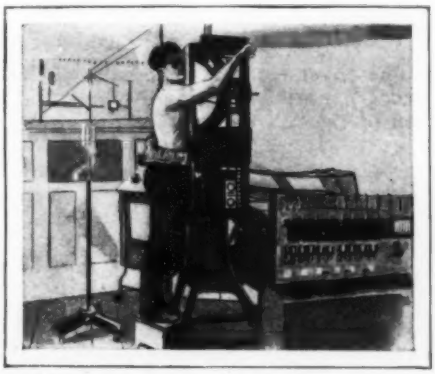
stream, is carried downstream a few feet, and in so doing operates a walking beam to which it is attached. At the end of each stroke, the paddle "feathers" and returns over the water to drop again. Its operation is quite the reverse of a man rowing a boat. The pump is connected to the walking beam.

THE "SLIPPER WATCH" IS LATEST IN TIMEPIECES

Just where to wear a dainty watch with the afternoon or evening gown has been solved in so many ways that an additional way would seem superfluous, yet a New York woman recently created a sensation at a dinner reception by thrusting out her foot when the time was asked. In the center of the buckle of a blue satin slipper was a silver watch about the size of a nickel, apparently held in place by half a dozen small diamonds.

MOTIONS OF HUMAN ORGANS SHOWN BY X-RAY CAMERA

An apparatus for photographing living organs in the human body by means of the X-ray so rapidly as to faithfully record their motions in a continuous series of pictures, has been developed recently and is described as a mechanical wonder. The metal holders which contain the photographic plates are arranged in the form of an open fan and turn around a shaft at their lower edge until they, one after the other, come into a vertical position, when the exposure is made, and the exposed plate slides away along a track. These motions are started by automatically operating electric switches and six exposures are made in 11/5 sec.



Taking X-Ray Pictures of the Motions of the Intestines; Exposed Plates are Seen Sliding Away from the Camera Proper

The mechanical problem of putting the heavy metal plate holders into motion and then stopping them for a fraction of a second is no easy one, and more than a year was spent in experimentation before the apparatus was given its final form.

POSTAGE-STAMP AFFIXER

This simple postage-stamp affixer, of only three parts and weighing but 2 oz., will enable anyone to attach stamps rapidly to mail of any kind or size. The stamps are moistened by a wet pad as they feed from the rolls, which may be purchased at any post office.

Simple Stamp-Attaching Device

THE U. S. MEDAL FOR THE "CARPATHIA'S" CAPTAIN

The obverse and reverse sides of the medal honoring Captain Arthur Rostron of the "Carpathia" for the rescue

Obverse and Reverse Sides of Medal for Captain Rostron; a Gift of the United States

of the survivors of the "Titanic" disaster, are here shown. Congress, at its last session, appropriated $1,000 for the medal. The chosen design is the work of John Flanagan, a New York sculptor. The medal is made of pure gold.

¶All drinking water used in the stations and on the trains of the French state railway, the "Nord," is to be sterilized by the ultraviolet-ray method.

TAPE RECORDS FOR LENGTHY PHONOGRAPH SELECTIONS

Opera and other musical selections, complete plays, speeches, and the like, all on one continuous record, played without one interruption, is promised as a revolution in phonograph records through experiments now being carried on in Chicago. Heretofore, there have been but two accepted forms of records, the cylindrical and the disk. The new records, if the experiments develop as expected, will be in the form of a tape not unlike a narrow typewriter ribbon.

This, however, is not all that is promised. On the present records, for instance, a duet with accompaniment is produced on the phonograph from one line or groove. On the tape record three grooves would appear side by side. Thus, Caruso might sing into one horn, Bonci into another, while a piano or orchestra played the accompaniment into a third, and the three, on the same tape record, be run off together, but each distinct and individual.

COLLAPSE OF MOVING-PICTURE THEATER

Just what caused this concrete motion-picture theater in a Cincinnati suburb to collapse is not known, but ten workmen who were at work completing the structure for one free grand opening to women and children on New Year's day, went down in the ruins. They were caught without warning. Seven of the ten were severely and fatally injured. Three were dead.

The structure was a reinforced concrete and brick building. The plans were duly approved by the Cincinnati building inspector and it is said the work of construction was examined from time to time by the city inspectors. It was built on the side of a ravine upon concrete columns 12 in. square, which brought the concrete floor on a level with the street above. The columns were arranged 12 ft. apart under the outer edges of the building. When the collapse came the center of

Complete Wreck of Moving-Picture Theater That was Nearly Completed

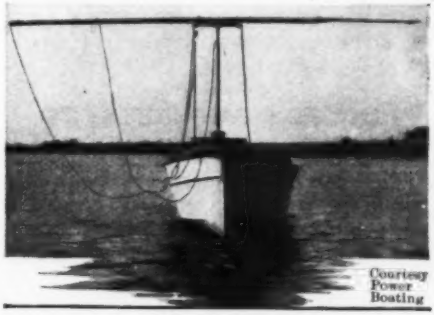
the concrete floor sagged and in an instant sank under its own weight. The walls tumbled in upon it, followed by the roof framework.

Workmen claim that the structure was not sufficiently supported by numerous columns other than those around the outer edge. Others say the forms were removed before the concrete had time to set properly. One workman said he knew that they were building a death trap for hundreds of women and children. It was just a question of time when the building would collapse. His thought was right, but it was an act of Providence that the accident happened before that free show for women and children took place.

HARPOONING SWORDFISH FROM A MOTORBOAT

Harpooning swordfish off the Massachusetts coast is a sport so fascinating to one man at least, that he has constructed a seaworthy 24-ft. V-bottom motorboat especially designed for the purpose, in which he runs as far out to sea as 40 and 50 miles in quest of the "game." On the forward deck of the stanch little motorboat, close to the bow, is a stand or platform, called a "pulpit," upon which the harpooner stands. The iron frame acts as a brace for the person casting the harpoon and also serves as a support for the harpoon when it is not in use, as shown in one of the illustrations.

Standing on the "Pulpit" Ready to Cast the Harpoon



Courtesy Power Boating

How the Harpoon is Carried When Not in Use

QUAINT JAPANESE SCENES IN LIVING CHRYSANTHEMUMS

Among the most interesting features of the great chrysanthemum exhibit in

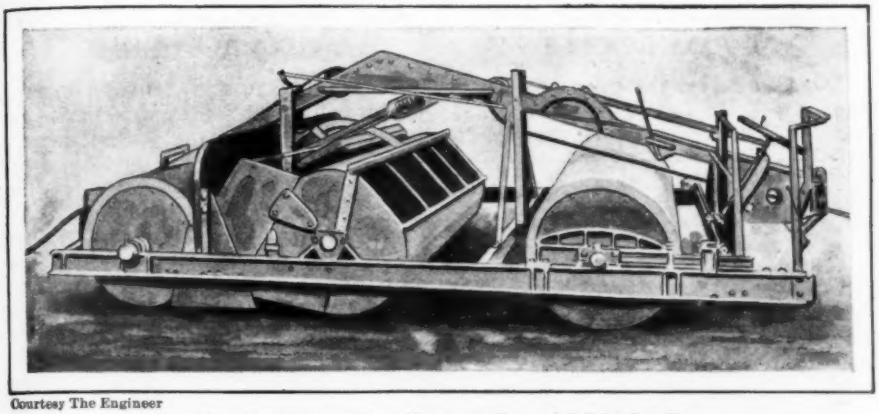
Old Tales of Japan Illustrated in Set Pieces of Growing Chrysanthemums

Honmoku, near Yokohama, were the grotesque scenes from old tales of Japan, made up of growing chrysanthemums. For nearly two months the gorgeous attire of the wire figures kept changing its patterns as the rows of flowers grew up and then gradually died away.

FUTURE SKYSCRAPERS TO HAVE APARTMENTS

The coming skyscrapers or office buildings will be complete cities in themselves, with apartments and every convenience of the modern home, according to Theodore Starrett, of New York City. These great buildings will, according to the same authority, be grouped around the terminals of large railroads, or be the transportation terminals themselves, like the Hudson Terminal building. In the basement there will be markets for supplying all the necessaries and luxuries of life. Banks will be arranged on the street level immediately above the markets. The next 25 or 30 stories will be given over to offices, and above these there will be an exchange and club concourse. The balance of the upper stories may be used as private apartments, over which there would be roof gardens, tennis courts, gymnasiums and swimming pools. It is not impossible that country clubs in the city also would become an actuality when the construction of the future office building is considered. Living at such a high altitude would work wonders for the health of people and make existence in the city during hot weather a pleasure, not to mention the freedom from noise and confusion usually present nearer the street level. The tall buildings of the future will possess the beauty of supreme utility, rather than minarets and towers, or any other feature that represents wasted energy. There will be ornamentation, but it will be of a nature not to interfere with the form of the structure. Special attention will be given to the size and arrangement of the windows in order to secure the maximum amount of daylight. Mr. Starrett also believes that the hundred-story office building is an actual possibility, although it will not be a skyscraper in the present meaning of the term.

¶A roof garden, for the convenience of reading patrons during warm weather, has been built upon one of the branches of the public library, Boston.



Courtesy The Engineer

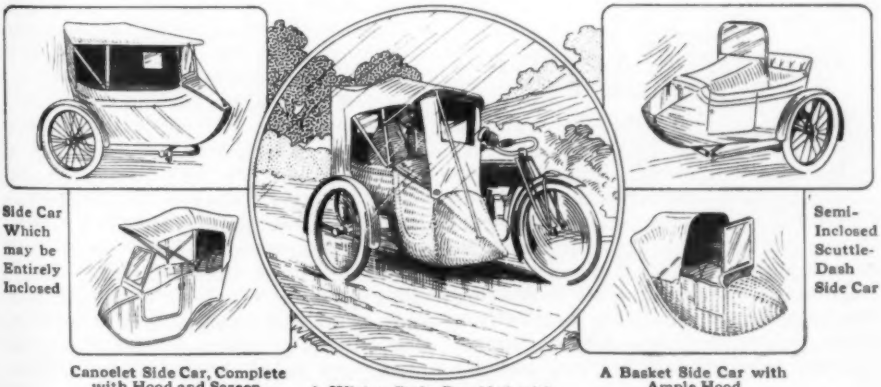
Land-Leveling Machine That Moves 240 Tons of Soil in One Hour

GIANT SCOOP FOR LEVELING LAND

The improved land-leveling scoop or "kassabieh" shown, used in Egypt and capable of shifting 240 tons of soil in one hour, consists of a steel frame within which are swung two steel rollers, 4 ft. in diameter and from 8 to 12 ft. long, according to the size of the machine. Between these rollers and immediately behind the front roller is hung, on trunnions, a scoop, at least 8 ft. wide. When the machine is in operation, the rotation of the front roller materially assists in filling the scoop, which is controlled by means of ropes from two hauling engines connected with a "runner" or wheel on the steel bar extending lengthwise above the rollers. The scoop of the largest-size machine has a capacity ranging from 7½ to 8½ tons of soil, and the entire machine weighs about 6½ tons.

INCLOSED SIDE CARS FOR COLD WEATHER

In England, where the side-car type of motorcycle is particularly popular with people of moderate incomes, the motorcycle shows run a close second in interest to the automobile exhibitions, and the autumn motorcycle show in London was of particular interest because of the many types of inclosed side-car bodies especially designed for cold weather.



Side Car Which may be Entirely Inclosed

Semi-Inclosed Scuttle-Dash Side Car

Canoelet Side Car, Complete with Hood and Screen

A Wicker Body Provided with Hood and Storm Curtains

A Basket Side Car with Ample Hood

DANCING THE PULP OFF COCOA BEANS

Cocoa grows in the form of a large bean in a long, yellow pod, the beans being surrounded by a soft, sticky pulp which must be rubbed off, and the beans nicely polished. This is accomplished by the very simple method of spreading them on a big floor when fresh, and setting a gang of blacks, mostly composed of women, to work dancing on them until each bean is polished like a new penny.

Copyrighted by Brown & Dawson, Stamford, Conn.

Trinidad Negroes Dancing the Sticky Pulp off Cocoa Beans

OHIO WOMAN A MASTER BOILERMAKER

Youngstown, O., has the distinction of having a female boilermaker. She received her technical education in drafting and the boilermaking trade in Cleveland and then personally directed shop work for six years. At the present time she is general manager of a large boiler company in her home city and does not hesitate to ascend the highest skyscraper in order to supervise the work of her foreman and his men.

ALL MOTOR-CAR DELIVERY FOR BIG STORES

Motor trucks only, instead of horses and wagons and some trucks, are now being adopted by the larger department stores of downtown Chicago for the delivery of all merchandise. This change will dispense with the use of about 1,600 horses and require between 700 and 900 more motor vehicles. The change also will effect a saving of nearly two miles of valuable street space, and add materially to the city's progress in other ways.

This adoption of motor trucks was brought about by the demand for quicker deliveries to all sections of the city and suburbs—a demand that could not be met in a satisfactory manner by the horse and wagon. The motor trucks, which were first put into service by these stores, were of a heavy type and were used for hauling heavy loads from the main stores to the delivery substations in various parts of the city. It was soon discovered that these motor trucks could leave the downtown stores one hour later and still arrive at the distributing point in time to meet the regular delivery wagons waiting there for the purpose of receiving packages for house-to-house delivery. When it was found that these machines were a success, a number of smaller ones were tried out on the longer hauls to the suburbs, with the result that deliveries to these points were made in from one to two hours' less time than formerly. Then the electric vehicle was tested out for the purpose of near-at-hand deliveries and, after a satisfactory trial, this type of car was added to the delivery service of a number of department stores.

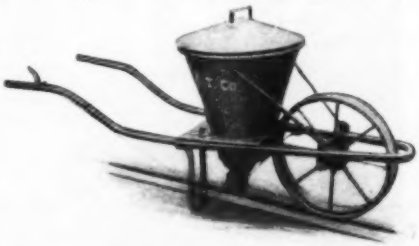
Current Deflector Used on Missouri River to Prevent Soil of Bank from being Carried Away

DEVICE DEFLECTS CURRENT OF RIVER

A deflector or apron that actually throws a swift river current away from the shore, thus preventing the soil from being carried away, has been put in operation on the Missouri River in South Dakota. The deflector, which is made of ordinary pine boards and floats on barrels at right angles to the shore, is 20 ft. long and 6 ft. wide. Beneath the floating section is another of similar construction which is fastened to the floater by means of hinges which allow the submerged section to swing at an angle, permitting the flow of the water, but always deflecting the current toward the middle of the stream and thus protecting the bank for some distance below the apron. The device is anchored by means of cables which are fastened to concrete blocks buried in the river bottom, 80 ft. above the deflector. Heretofore the river's banks in that section have been protected by the use of expensive riprap, or a willow mattress, which was quickly cut to pieces by the swift current. It is claimed that the cost of protecting a dangerous section of the bank in this manner will be many times less than by the use of riprap.

STREET-CAR TRACK SANDER

This street-car track sander is made entirely of iron without the use of rivets or bolts, and the cone-shaped iron can, which holds about 10 gal., has a valve at the bottom for releasing the sand by means of a thumb lever upon



New Track Sander for Street Railways

the right handle. The rim of the wheel is similar to that of an ordinary wheelbarrow except that it is 3¼ in. wide with a flange on each side for keeping the sander on the track.

SAFETY-RAZOR BLADE AS SURGEON'S SCALPEL

Ordinary double-edged safety-razor blades may be used as surgeons' scalpels, or knives for cutting tissue, when

How a Safety-Razor Blade may be Used as a Surgeon's Scalpel

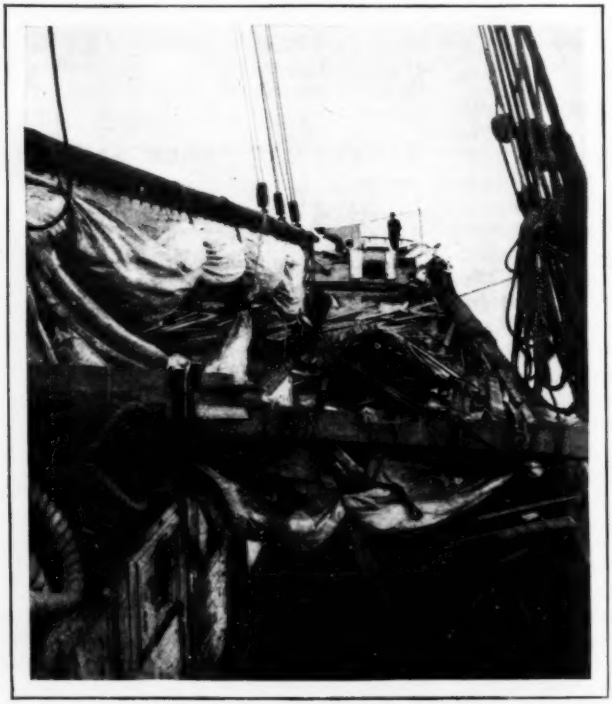
mounted upon handles in the manner shown. The usual type of scalpel handle is provided with two arms, to one of which is attached two stubs that fit into the two holes of the blade while a thumbscrew serves to lock the arms and hold the blade securely in position. The double-edged blade may also be made into a single-edged instrument by inserting one edge under a broad flange attached to the carrying arm of another type of handle.

MONO-CABLE RAILWAYS FOR SOUTH AMERICAN COAST

A company has been incorporated in this country to construct and operate a system of mono-cable railways in the mountainous districts along the Pacific Coast of South America, where the operation of railroads is impracticable because of the expense of grading and tunneling. The cable will serve simply as a suspension for the cars, each of which will contain its own motive power. The first line will be constructed in Peru.

THE LIFE OF CONCRETE BRIDGES

Whether the serviceable life of a concrete bridge corresponds more nearly to that of the steel bridge or to the much longer life of the old stone-masonry bridges is a question exciting considerable interest in bridge-construction circles. No concrete bridge, according to the Engineering and Contracting Magazine, has yet an age of 50 years, which is the limit of useful life commonly assigned to steel bridges. It would seem from the discussion, however, that the question depends upon just what kind of a concrete bridge it is. There is a class of concrete bridges which are essentially stone-masonry structures in every particular except material. That is, they are as heavily constructed as the stone-masonry bridge, and much in the same manner, the only difference being that the material is heavy



Tangled Mass of Lumber and Wreckage on the Deck of Wrecked Schooner "Oceanean Vance" as She was Towed into Port Townsend, Ore.

masses of artificial stone instead of stone blocks. Then there is the other type of concrete bridge that depends particularly upon its reinforcing, being constructed, when all is said and done, in a structural manner very similar to the ordinary steel bridge. The latter type of bridge, it is believed by many engineers, will not outlive for any extent of time the 50 years given an all-steel structure, but, unlike the steel bridge, repair and upkeep costs are practically eliminated.

STANDING ON THE MAT SIGNALS ELEVATOR

The push-button system of signaling the elevator is to be discarded in one of Chicago's big stores, and electrical-contact mats will be laid on the floor in front of the door of each elevator shaft. When a person steps upon this mat an electrical circuit is closed just as when a push button is pressed.

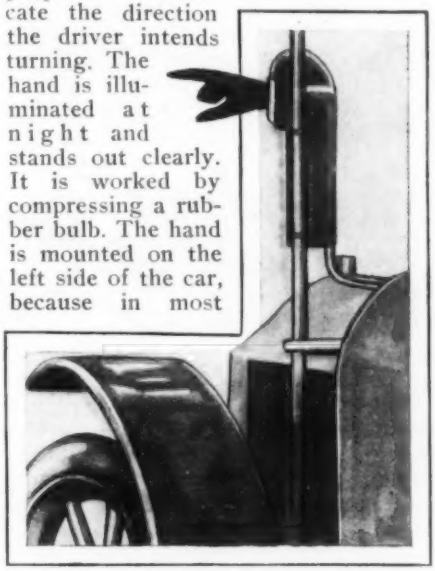
OUR GOVERNMENT'S MEDAL FOR VALOR

Two captains, two lieutenants and a quartermaster-sergeant were recently presented with this medal of valor, which is the highest honor the United States has to give. One of the officers, Captain Gaujot, of the 1st Cavalry, went alone under fire into the federal garrison at Douglas, Ariz., and persuaded the Mexican government refugees to surrender to him before they were all killed by the insurgents. The four other "honor men" received the medal for capturing a notorious Moro pearl pirate in the Malay Islands.

The medal is of solid gold, and is worn suspended around the neck by a broad blue ribbon.

THE DIRECTION HANDS OF BERLIN'S TAXICABS

Many of the taxicabs in Berlin are now fitted with automatic hands whose purpose is to indicate the direction the driver intends turning. The hand is illuminated at night and stands out clearly. It is worked by compressing a rubber bulb. The hand is mounted on the left side of the car, because in most European countries vehicles always take the left side, instead of going to the right, as in this country.



German Taxicab Fitted with Automatic Direction-Indicating Hand

STEEL FURNITURE MAY SUPPLANT WOOD

Steel furniture for offices and factories will, during the next 10 years, entirely supplant that now being made from wood, according to an official of the largest metal-equipment manufacturing concern in the west. As steel furniture and fixtures are fireproof and more economical, builders are discarding the old-fashioned wooden equipment and installing steel in many of the new buildings. The use of this material also enables the floor space of the average factory to be increased, and lower rates are given by insurance companies when this class of furniture is installed.

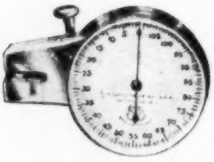
"CHURCH SPIRE" SECTION OF DES MOINES

A section of Des Moines, Iowa, is noted because of its church spires, there being seven spires on churches, the farthest apart of which are hardly more than a block from each other. When all the bells ring at the same time the sound is impressive.

The Seven Spires in a Limited Area of Des Moines

GAUGE FOR MEASURING THICKNESSES

This gauge will accurately measure the thickness of materials, such as sheet metal, sheet rubber and leather, or any material not exceeding .110 in. in thickness. The device is held in the hand and the material is inserted in the jaws, which are opened by pressing the push button with the finger. When pressure on the button is released the jaws automatically close and the thickness of material is automatically indicated on the dial.



¶The City Club of Chicago has offered $600 in prizes for plans for laying out, as a residence district, a typical area in the outskirts of the city.

FREAK CLAY WHICH COOLS SUDDENLY

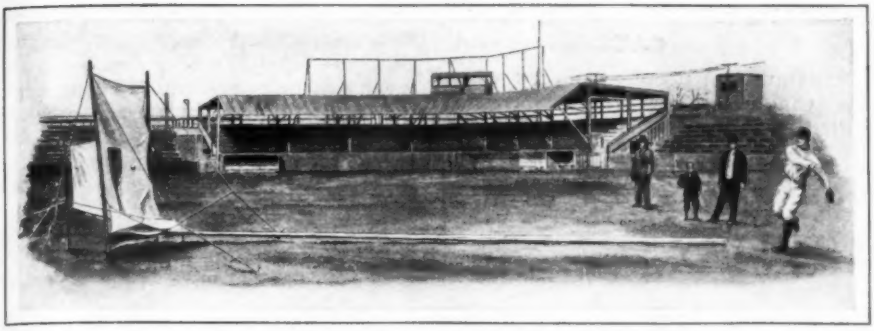
What is believed to be a new freak clay has been found in the bed of the Spring River in the heart of central Oregon. The clay resembles an asbestos fiber when burned, and the fact that it will not hold heat for more than a few seconds is one of its strange properties which has set scientists and geologists of the state to thinking.

The clay has a considerable portion of vegetable matter in its composition. When this vegetable matter is burned out the clay becomes flourlike. This flourlike powdered clay will stand an intense heat without showing any discernible change and can be picked up with the naked hand almost as soon as it is taken from the fire. In many respects it has the properties of a high-grade asbestos mineral, but no one has presumed to classify it as a sort of asbestos.

The vein from which the clay was taken is about 20 ft. wide and is known to extend entirely across the river bed. How much farther it may reach has not been ascertained.

DUMMY BASEBALL CATCHER FOR PITCHERS

A pitcher's target or dummy for catching baseballs, that does the work of a human baseball catcher, has been designed by an old ball player. The invention, as shown, is a canvas sheet with an opening just above the home plate, a pocket in the rear, and an instrument for recording balls and strikes. A graded, troughlike affair returns the ball to the pitcher and, in order to avoid delay, it is necessary to use two balls so that the pitcher always has one at his feet for deliv-



Target for Catching and Recording Baseballs Thrown by Pitcher

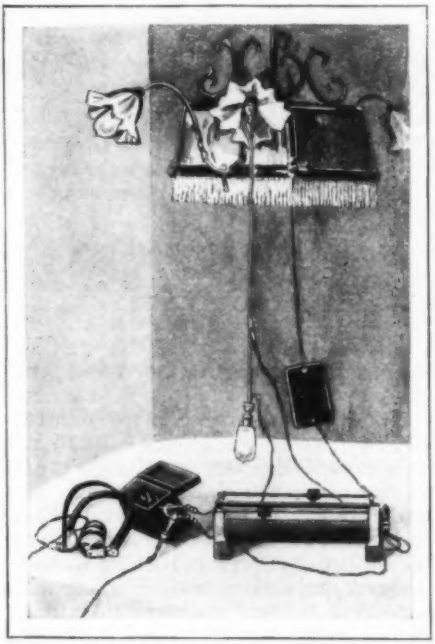
ery. By the use of this invention a manager may "warm up" a pitcher secretly, and the recording feature makes it possible for him to tell just how many balls, strikes, and wild pitches have been delivered.

FIRE-FIGHTING MOTOR CAR WITH NIGHT LIGHTS

The motor car used by the "flying squadron" of the Minneapolis fire department has been equipped with night lights in order to maintain with safety the high rate of speed at which the vehicle travels at night. Two red electric dash lamps show when the car is approaching an intersecting street with the intention of crossing it. The red light on the right-hand side is shut off in turning to the left, and the left-side light is turned off when the car is going to turn toward the right. In this manner the traffic policeman can instantly tell the direction the car is intended to take and control his crossing accordingly. The lights are operated by a switch at the steering gear of the machine.

WIRELESS MESSAGES FROM ELECTRIC-LAMP SOCKETS

The French government reserves for itself the privilege of sending wireless messages, but there is no objection to individuals installing receiving stations, and many outfits have been devised. One of the most ingenious and novel of these is a compact little outfit which actually intercepts wireless communications by being plugged to any electric-lamp socket that receives current from overhead electric wires, which are thus impressed into service as the antenna. In the instance shown the lighting fixture happens to be of the combination electric and gas type, so the ground connection is made through the gas pipes.



A Wireless Receiving Outfit, Placed on a Dining-Room Table, and Receiving Wireless Communications by Being Plugged to the Electric-Lighting System

FIRE DEPARTMENT RESCUES A CAT

Hundreds of people gathered when the Cincinnati fire department was called out to rescue a cat which had

Cat-Fishing in Cincinnati

been scared up a tree in Washington Park.

Tommy was up in the tree for two days and as he was an old cat and had only one of his nine lives left to go on he was afraid to risk that one life. The Ohio Humane Society was notified and the fire department was called out on the most unique run in its long history. A hook-and-ladder wagon filled with extension ladders and firemen hurried to the scene of action. A long ladder was placed under the tree and run up among the branches. Two firemen scaled the ladder, but the higher the firemen climbed the higher the cat climbed until Tommy was beyond reach. Some one brought a long bamboo fishing pole and with a wire noose at its end the firemen began to fish for Tommy on his swaying perch for more than an hour before he was rescued.

The picture shows the firemen perched at the top of the long ladder trying to hook Tommy on the end of the fishing pole.

CONCRETE BRIDGE FLOODED AS A "LOAD" TEST

Converting a new concrete bridge into a temporary pond of water was the novel load test adopted by the constructors. The "loading" of the bridge with water was very easily and cheaply done. The parapets of the bridge are solid concrete with sunken panels, and clay dams, 3 ft. thick at the base and 1 ft. at the top, were built up at each end. The water was run onto the bridge through a 2½-in. hose. The load, which exceeded the required 250 lb. per square foot, was applied in 8 hours.

MOTOR CAR DESIGNED FOR SAHARA DESERT

A motor car that has wheels of unusual height and breadth of tire is here shown. The vehicle was designed especially for traveling over soft road surfaces and is used in making successful runs over drift sand in the great Sahara Desert, near Cairo.

Broad-Tired Motor Car Used on Sahara Desert

STRANGE WOODS FROM THE PHILIPPINES

In the interior construction of a house which he will erect at Westwood Park, Mass., W. Cameron Forbes, Governor-General of the Philippine Islands, will use various woods imported from the islands and unfamiliar in western countries.

One of them is called red narra and is similar to mahogany. Tindalo is the name of another variety, which grows a rich red with age. Among the others are acle, which bears a resemblance to oak; molave, an exceedingly hard wood; camagon, very heavy and like ebony; supa, of a brown tone, unlike any native American wood; ipil, more durable than oak, and calantas, which is like cedar and has a similar odor. Of the last there are already in storage in Massachusetts boards 35 ft. in length, 52 in. wide and 4 in. thick. Dungon is the name of another wood that is so heavy and hard that it cannot be used with facility in any building operation.

With the opening of roads into the interior of the Philippine Islands and the development of railroads, it is predicted that the lumber industry will become one of the most important items of their commerce.

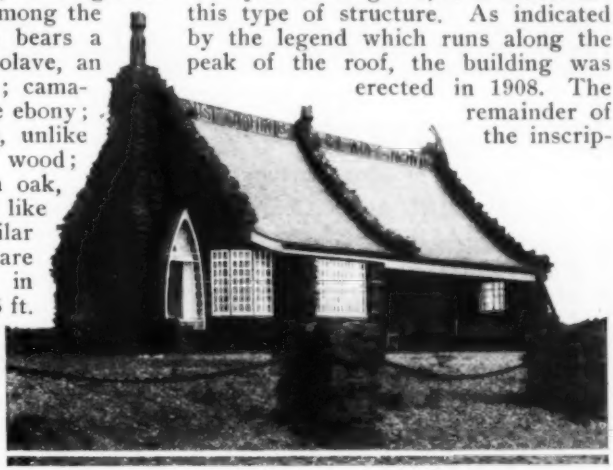
FIRE BRIGADE HAS PART IN LANDING ZEPPELINS

A fire brigade as well as a corps of specially trained troops is usually required in the landing of a Zeppelin airship. When a Zeppelin comes down at one of the aerodromes, the troops catch the lines, the tail is forced down by propeller draft on the elevators, and immediately the ship touches the ground, the fire brigade dashes up and pumps water into her ballast tanks, so that she will lie steady on the ground.

On starting a flight, the airship is held head to the wind by the soldiers, the water is run out, the bow is allowed to rise, and the voyage commences with very little trouble.

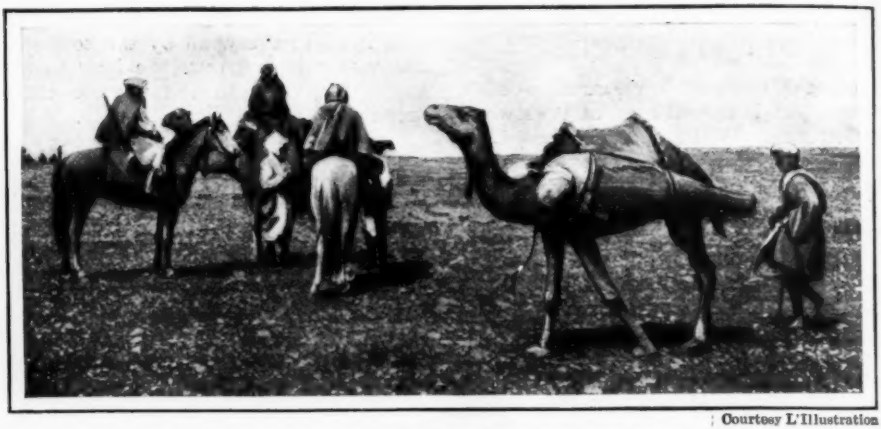
QUEEN ALEXANDRA'S BUNGALOW

The royal bungalow at Snettisham, Norfolk, which is occupied by Dowager Queen Alexandra when she visits that part of England, is a model for this type of structure. As indicated by the legend which runs along the peak of the roof, the building was erected in 1908. The remainder of the inscription includes the Latin words "Nisi Dominus," and letters signifying "Alexandra, Queen, Empress." These words, which are also the motto of the city of Edinburgh, begin the first verse in a Latin version of Psalm 127: "Except the Lord build the house, they labor in vain that build it; except the Lord keep the city, the watchman waketh but in vain."



Bungalow of Great Britain's Dowager Queen at Snettisham

Claiming that fish make swimming noises that can be heard by telephone, a French inventor has designed an apparatus consisting of a receiver and a detonator for fishing purposes. When fish in any number pass the receiver a sound is heard by the watcher, a button is pressed, which explodes the detonator, and the stunned and dead fish rise to the surface.



Courtesy L'Illustration

Method Used to Transport Dead Soldiers Killed in France's Moroccan Campaign. The Bodies were Swathed Like Mummies and Carried by Camel across the Desert for Burial in Chosen Ground

GOLD MINE IN KANSAS ASH PILE

When a structural-steel company purchased the site of the old smelter in Argentine, Kan., it paid $45,000 for the property. Since that time it has taken out of the ground more than $100,000 in gold, silver and lead, and probably, before its operations are finished, it will have cleaned up a net profit of that amount, if not considerably more.

The old consolidated smelter was one of the largest smelting plants in the country until 10 years ago, when, for economical reasons, it was dismantled. In the 20 years of its operation, it is estimated that fully half a million dollars in precious metals were lost incident to the reduction of the ores. Most of these were carried off through the flues to be scattered in such infinitesimal quantities over the surrounding land that no profitable method for recovering them can be devised. The remainder was lost through leakage, absorption, or in the form of droppings which were swept out of the buildings. It is from these sweepings and from the wreckage of the old retorts that the steel company has realized so handsomely on its investment.

Digging Gold from Old Smelter Debris

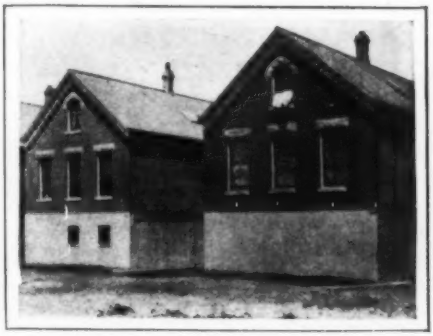
Chance led an old prospector to settle in Argentine. Walking across the old smelter grounds one day, he picked up a piece of rich ore. A quiet investigation showed him that there probably was much other ore scattered over the grounds. He confided his findings to the manager of the steel company and under the manager's direction made a more extensive investigation which confirmed his belief. The steel company then built a concentrator on the ground, set half a dozen laborers to digging out all the old smelter debris and began turning out concentrates at

the rate of about $200 a day. At the time this was written about $100,000 had been taken from the ground, with a large area still to be dug up.

DELIVERING MAIL TO BACK-DOOR HOUSES

Recently the postoffice department has prescribed a number of rules that have to do with the number of steps a carrier has to take in order to deliver mail to addressees under one roof. It has been forbidden to deliver mail above the ground floor in apartment buildings and flats. The houses which have no front doors, there being but one entrance and that in the rear, so that a carrier must travel extra miles in walking back and forth, are much in disfavor.

It is not generally known that Chicago has thousands of such buildings, and the postoffice department threatens to lay down the law to the occupants. The picture shows two such houses in a locality where it is a common thing to see a row a block long. The builders claim that they are able to put in an extra room by doing away with a porch and the entrance therefrom.

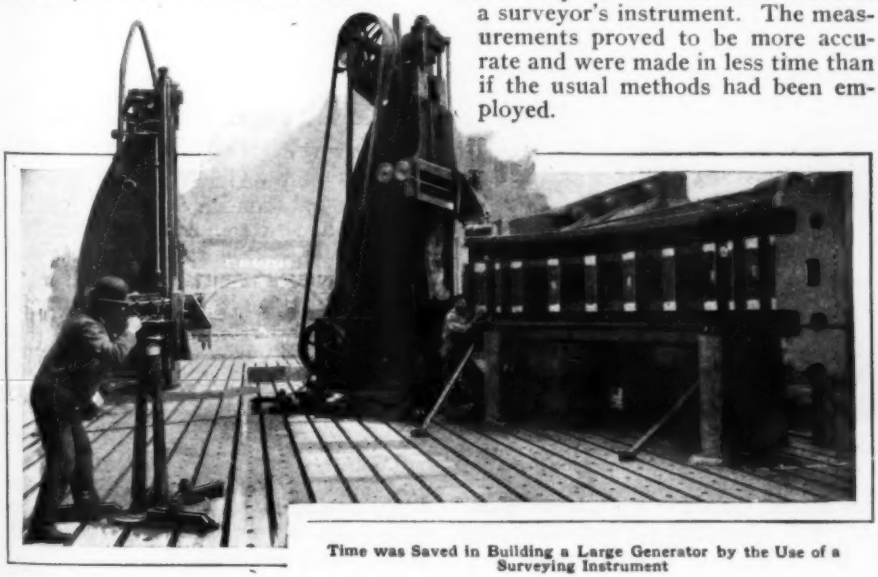


Houses with Back Doors Only

¶ More than 1,000,000 automobiles were in operation in the United States at the close of the year 1912.

LAYING OUT MACHINE WORK BY SURVEY

In building one of the largest generators, in which the frame had to be made in sections, it was found expedient to lay out some of the work with a surveyor's instrument. The measurements proved to be more accurate and were made in less time than if the usual methods had been employed.



Time was Saved in Building a Large Generator by the Use of a Surveying Instrument

Landing a Section of Telephone Cable on Goat Island, San Francisco Bay

MAKING THE CEMETERY A PHOTOGRAPH GALLERY

An extraordinary method of marking the graves of the dead is found in Norridgewock, Me., where the monuments are provided with a place for the photograph of the deceased person. A recess for the photograph is chiseled into the stone and a hinged cover placed over it for protection against the weather. This is an old custom in Norridgewock, and one

Monument in Norridgewock Cemetery Bearing Picture of the Deceased in Recess under the Name

monument, placed in 1865, bears a still very well conserved picture of the man in whose memory it was erected.

SUBMARINE CABLE-LAYING IN SAN FRANCISCO BAY

A large submarine telephone cable, 23,000 ft. long and weighing 16 lb. per foot, was recently laid in San Francisco Harbor to connect Oakland, Alameda and Berkeley with San Francisco. The cable was laid in two sections, one from San Francisco to Goat Island, and the other from Goat Island to Oakland. The work was done by the cable-laying lighter shown in the illustration, which was especially constructed by the telephone company for the repair of the many telephone cables in the bay, and for laying the new. The reel has a capacity of 10,000 ft. of 3-in. cable, which may have a maximum weight of 85 tons.

MODELING MICROSCOPIC INSECTS

A girl sculptor in Pittsburgh is making a reputation in scientific circles with a kind of sculpture or modeling that is unique. She models insects and other animals which are so small as to be almost invisible without the use of the microscope. The specimens she wishes to reproduce in plaster are first photographed through a microscope, and it is through study of these photographs that she makes the molds.

¶Coke is selling at $46 a ton in an Idaho town, due to the cost of hauling it by wagon from the nearest railroad point, 110 miles distant.

PASSING OF ELECTRIC HEATERS ON CARS

On account of the high cost of keeping the interior of street cars warm with electric heaters during cold weather there is a growing tendency to discontinue this form of heating, except in localities where the weather conditions are such that the cars can be kept comfortable with a comparatively small amount of heat. It has been demonstrated that less than 10 per cent of the fuel consumed at the power house appears as heat in the cars, and that it also requires more electric current to keep a car warm in extremely cold weather than is necessary to propel the car. The electric heater also is the cause of not infrequent complaints, as this heater cannot be installed in a position most advantageous to the perfect distribution of the heat, such as is possible by using air, steam, or hot-water heaters. The officials of several electric roads, upon which cars heated by various systems have been tried, claim that heating the cars with air or water circulation is a great economy and also far superior to the electric heater, as far as the comfort of the public is concerned.

The 1913 model of one of the well-known makes of motorcycles has two speeds, and is equipped with a self-starting mechanism. Pressure on a small foot lever releases a powerful spring which spins the motor.

ANCIENT ATTEMPTS AT GRAFTING SURGERY

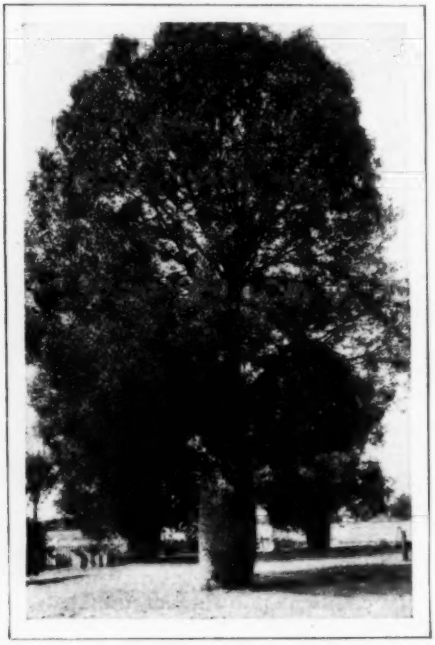
The art of replacing or transplanting certain human tissues, says a writer in L'Illustration apropos of the world-wide discussion of Dr. Alexis Carrel's wonderful successes along this line, was, in fact, known since the remotest antiquity. In India, a caste existed that was renowned for its skill in replacing cut-off noses, and had a great practice because it was a very common punishment inflicted on certain criminals to remove this appendage. From India this sort of surgery found its way to Italy, where, in

Sixteenth-Century Painting by Unknown Artist of Attempt to Graft Slave's Leg on White Patient

the fifteenth century, two itinerant Sicilian surgeons, the Brancas, father and son, enjoyed quite general fame as readjusters of the human anatomy. Similarly, in the sixteenth century, a Bolognese surgeon, Caspar Tagliacozza, who died in 1599, became a celebrity through his attempts at grafting and transplanting animal organs or members from one individual to another. Perhaps it was he who, encouraged by minor successes, once attempted such an operation as that represented by a contemporary artist in the painting of which the accompanying illustration is a reproduction; an operation which, even today, must obsess the imagination of Carrel and his disciples.

BOTTLE TREES FED TO THIRSTY CATTLE

The bottle trees of Australia, interesting curiosities in themselves, are of additional interest because they have saved the lives of thousands of cattle in times of drought. One of these trees is a godsend to the traveler who is unable to find water elsewhere, for if it be tapped, it will yield a sufficient flow of the precious fluid to quench his thirst. The tapping of the trees, however, is not sufficient when droves of cattle are suffering for water, so the trees are chopped down by the hundreds, and the soft, pulpy interior of the trunks fed to the cattle.



The Curious Australian Bottle Tree Which is Sometimes Fed to Thirsty Cattle

Although, as already stated, thousands of cattle have been saved by this tree, many others have perished from the effects of overeating, when, succeeding a prolonged drought, an inch of rain has brought up the grass within a few hours, and the cattle, already crammed with bottle-tree fodder, have attempted to make a second square meal of grass. Under such conditions, the cattle have died in hundreds, and in the stomachs would afterward be found balls of the bottle-tree fiber which the system had failed to digest.

BUMPS AND WATER BREAKS IN ROADS UNLAWFUL

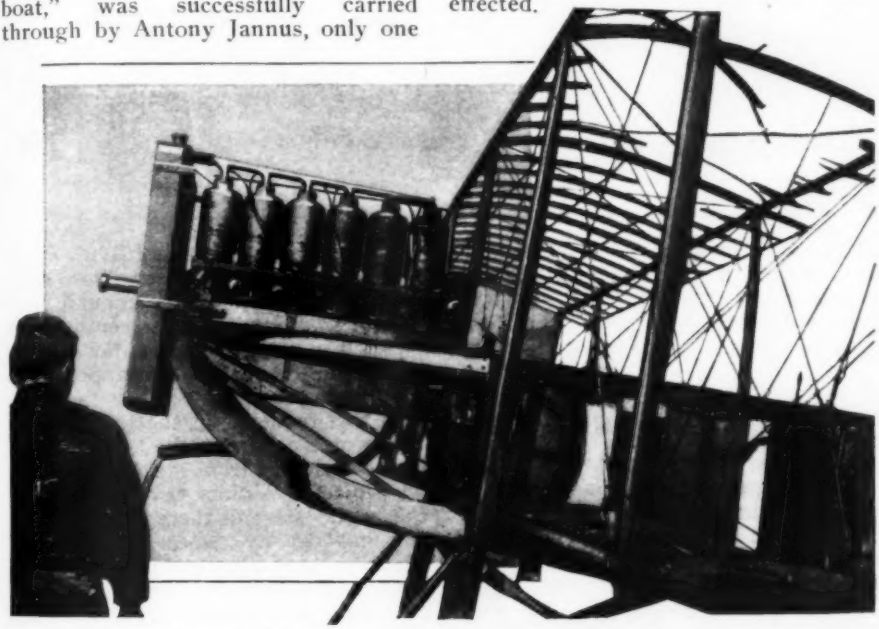
An important decision for motorists was rendered recently in the Supreme Court of Pennsylvania concerning the unlawfulness of road obstructions. A township was sued because of damage sustained in crossing a water break in a public road. The defense of the township was that these water breaks were necessary to carry off the surface water and that they had been in the road for a number of years.

The court decided that neither of these defenses was good, as time did not sanction unlawful obstruction of highways and water breaks were not considered necessary by modern road builders.

The decision also applies to other obstructions than water breaks. The bumps, placed across the roads in one of the suburbs of Chicago to keep motorists from speeding, would, for instance, also fall under the head of unlawful obstructions.

OMAHA TO NEW ORLEANS BY HYDRO-AEROPLANE

The hydro-aeroplane trip from Omaha to New Orleans, a distance of practically 2,000 miles, the longest journey ever attempted with a "flying boat," was successfully carried through by Antony Jannus, only one accident of any moment marring the undertaking. His machine caught fire just as he was saying "good-by," preparatory to leaving St. Louis for Cairo. The extent of the damage is shown in the illustration. The fire delayed the trip only a short time. Jannus, of course, followed the river route for the entire trip.



The Damage Done by Fire to the Jannus Hydro-Aeroplane at St. Louis

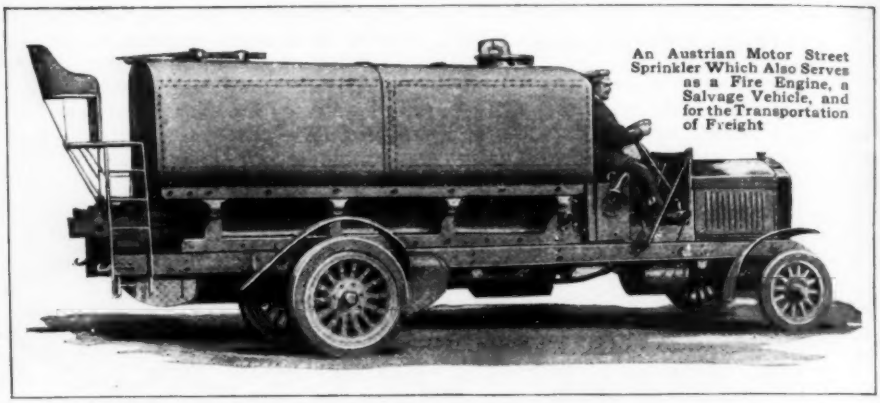
MAKING CONCRETE PILLARS IN MINES

Much concrete is now being used in coal mines for the construction of permanent supports in main galleries, and the crushed stone needed has heretofore been taken down into the mine through the shaft. To avoid this unnecessary transportation, one German company has installed in its mine a small stone crusher, driven by a 15-hp. compressed-air engine, which reduces the stone and rocks encountered during the mining operations to suitable size for concrete mixing. A double saving in hoisting is thus effected.

A MOTOR TRUCK OF MANY USES

The municipal authorities of Vienna have acquired several motor trucks which have been characterized by some writers as "maids of all work" because of the various services they can render, such as watering roads, extinguishing fires, pumping out flooded cellars, and transporting freight.

When used for tasks in which water is needed, the chassis carries a 1,000-gal. tank. The 50-hp. motor, which propels the truck, is also connected up to a turbine pump. This pump forces the water in the tank either to the sprinkler, or, in the case of a fire, to the hose attachments. As a fire engine, it can send a stream of water over the



An Austrian Motor Street Sprinkler Which Also Serves as a Fire Engine, a Salvage Vehicle, and for the Transportation of Freight

Town Hall of Vienna. As a salvage vehicle it will pump out cellars to a depth of 25 ft., and, with the tank removed, it may be used as a 6-ton freight truck, drawing a 4-ton trailer.

BASEBALL DIAMOND BUILT ON MOUNTAIN SIDE

A mining town in Arizona lays claim to one of the most novel baseball diamonds in the world, built out of the side of a mountain with refuse from the smelter and concentrator plants. The town in question is Morenci, which has a population of 5,000, and a desire for baseball. There was, however, no level space large enough for a diamond, so the baseball enthusiasts selected a likely place on the side of one of the mountains and appealed to the mining company for help. The help was rendered in the form of carloads of slag from the smelter and material carried from the concentrators by sluices. Within two years after the work started there was enough "ground" to lay out a diamond, the blasting out of a part of the side of the mountain to obtain ores for fluxing purposes aiding materially.

Having No Level Space Large Enough to Play Ball on, Morenci, Ariz., was Provided with a Diamond Built Out of the Side of a Mountain

REFRIGERATING VESSEL AND BARGES

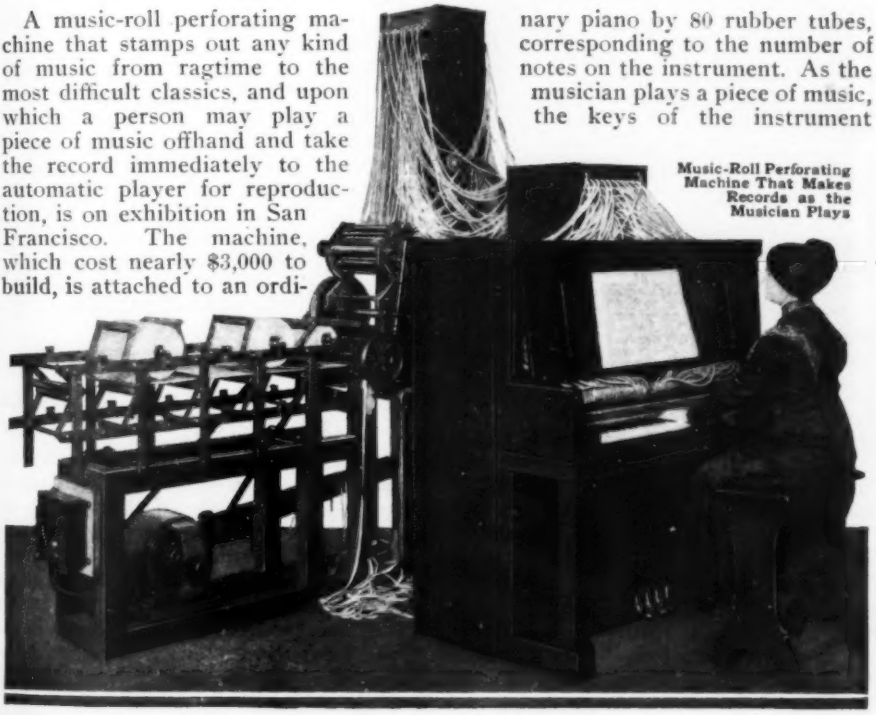
Owing to the fixed bridges which prevent the passage of ships, refrigerated barges are used on the River Thames, London, to convey meat from the import vessels to its destination. As many as six barges, having a total capacity of about 300 tons, are refrigerated and towed from place to place by a refrigerating barge. The "master barge" is equipped with a complete ammonia refrigerating plant, which cools the meat-carrying barges through flexible-hose connections, the latter being roofed in and insulated partially in the same manner as the cold chambers of ocean steamers. The insulation consists of charcoal placed

The Refrigerating Barge Alongside One of the Meat-Carrying Barges

between double thicknesses of wood lining, with felt and paper intervening, and especially arranged air spaces. The amount of cold brine left in the pipes of each barge after the refrigerating barge has severed connection is sufficient to keep them at a low temperature for a considerable time, so that they may be left a day or two by the "master barge."

MAKES MUSIC ROLLS WHILE YOU PLAY

A music-roll perforating machine that stamps out any kind of music from ragtime to the most difficult classics, and upon which a person may play a piece of music offhand and take the record immediately to the automatic player for reproduction, is on exhibition in San Francisco. The machine, which cost nearly $3,000 to build, is attached to an ordinary piano by 80 rubber tubes, corresponding to the number of notes on the instrument. As the musician plays a piece of music, the keys of the instrument



Music-Roll Perforating Machine That Makes Records as the Musician Plays

cause slots to be cut in a roll of paper known as the "master record," which automatically unwinds from the machine as the playing continues. The slots are made instantly and the master record, which is ready for reproduction as soon as the player strikes the last key, may be passed through duplicating machinery which produces one hundred 40-ft. records an hour. The operation of the machine is so simple that a great musician could sit down to the piano and compose a sonata, and when he had finished it a child could reproduce it exactly on an automatic player.

THE LUNGS OF THE U. S. CAPITOL

In the Capitol grounds at Washington are two gray granite structures, screened by foliage and vines, which

One of the Fresh-Air Intakes in the Capitol Grounds in Washington

interest the stray tourist because there is apparently no reason for their being. These towers, however, which are 20 ft. high and 10 ft. in diameter, play an important part in the elaborate ventilating system of the Capitol. They are the intakes through which the outer air is sucked in by pumps and forced to the different parts of the building.

NEW-STYLE MOTOR OMNIBUS

The motor omnibus has reached its greatest development in London, partly because the people were long accustomed to use the horse busses, partly because there are no street cars in the business section, and also because the uniformly smooth streets make the ride in a London bus far more comfortable than in our own street cars.

The last horse-drawn busses were driven into oblivion one year ago, and in their places came thousands of these motor vehicles, seating about 20 passengers inside and as many more outside on top.

The new motor bus, which will shortly be on the streets, seats 48 and is built more like a street car, in that the passengers will enter at a door in the middle of the car, and the engine will be placed beneath this central platform. The car runs on four wheels, but either one or both pairs of wheels may be connected to the engine at will. Instead of turning the car at terminals, the driver has only to change to the other end.

GROWING JAPANESE OYSTERS IN PUGET SOUND

In order to ascertain if Japanese oysters can be grown in Puget Sound the oyster growers of the state of Washington are conducting experiments toward this end and have ordered a large quantity of seed from Japan for the purpose. As the Japanese variety equals in size and flavor those grown in eastern waters and matures one year sooner, special efforts will be made to cultivate them.

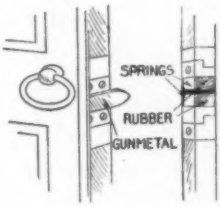
Homemade Concrete Mixer

While going through the country I met one of those mechanical geniuses so often found on the farm. He had many labor-saving devices on his place and, among other things, he told me about laying a concrete floor for use as a feeding place for the hogs, and how quickly he had accomplished the work in making it. I then looked for his concrete mixer, for I knew that he must have something of the sort for doing this work. I learned that the machine was at one of the neighbors, where we went to see it. The mixer is a rare work of simplicity and economy. All that was purchased to build it was a pulley for the belt, every other part being found on his place. The mixing box is made of 1 by 8-in. boards, laid inside of two rims of corn-planter wheels. The gear around the box came from an old manure spreader, and the rest of the gearing from the two mentioned implements. The barrel supplies the water through the pipe. The truck was one used on an old gas engine.

The mixer is a great success, as the work done by it which I saw was of the best. The use of the machine requires some common sense, and as the builder had lots of that, he succeeded in constructing an efficient machine at a very low cost.—Contributed by Daniel Scoates, Agricultural College, Miss.

Anti-Rattle Lock for Automobile Doors

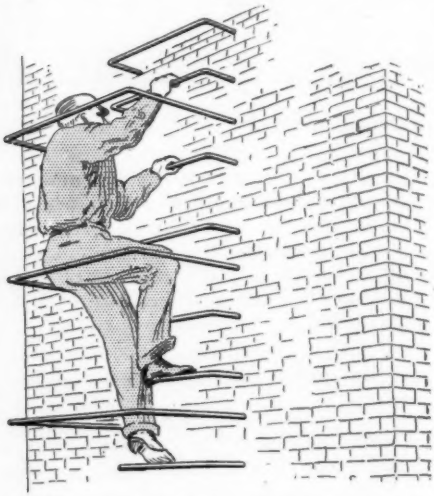
Rattling automobile doors are a nuisance, and the number of devices invented to stop the noise are almost without number. In the sketch is shown one of the latest methods employed to insure a tight-fitting door free from the objectionable rattle. The gun-metal tenon fits in between two small blocks of rubber covered with sheet steel.—Contributed by Stanley P. McMinn, Brooklyn, New York.



The Concrete Mixer as It is Made of Parts Found on the Average Farm and Used Particularly for Mixing Concrete to Make Feeding Floors for Hogs

Safeguard for Chimney Ladders

The U-shaped metal rungs fastened into large brick chimneys to form a ladder may be safeguarded by fasten-



The Climber is Safeguarded by the Large Loops Forming Every Third Rung

ing other U-shaped pieces of such size as to permit the body of the climber to pass through them. The larger pieces may be fastened into the brick alternating with the smaller ones or take the place of every third rung, as the builder may see fit. The climber can face outward if he likes in climbing, as he can use the large pieces or rungs as hand holds.

Rebuilding a Refrigerator

During the winter when the refrigerator is not in use, it might be rebuilt for the summer time in the following manner, which will result in a great improvement and will more than repay the work done. The principle upon which this change is made is that of the vacuum bottle, two walls inclosing a space exhausted of air.

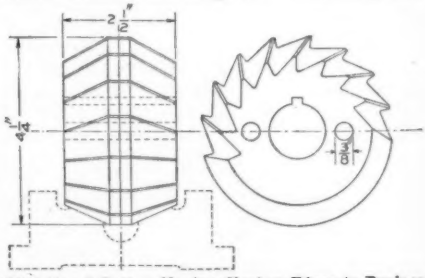
To apply this plan to the refrigerator, it is only necessary to remove the inner wall filling, which usually consists of sawdust or asbestos, and then cover the box, both inside and outside, with sheet metal, such as tin or zinc, preferably the latter, soldering all joints so that an absolutely air-tight space is procured. The doors are rebuilt in the same manner. After this is completed, cut a hole leading into the space between the walls and insert a short tube with a valve or some other means to keep the air from entering after it has been exhausted by means of an air-exhaust pump.

If the covering has been perfectly made and the air thoroughly exhausted, the ice will melt very slowly unless the doors are opened unnecessarily or heated articles placed inside. The entire refrigerator is now similar to a large vacuum bottle.

Spiral-Shaped Milling Cutter

A large number of cast-steel holders, of the form shown by the dotted lines in the sketch, had to be machined and this demanded a cutter of special form. The first cutter made had the teeth milled straight across the periphery and gave considerable trouble by pounding, as each tooth came in contact with the work, leaving chatter marks unless a slow feed was used.

The second cutter was made in halves, held together by two pins as shown. The teeth were cut at an acute angle to the sides so as to slant backward from the apex of the cutter. This form of tooth gave a shearing cut



High-Speed Cutter, Having Sloping Edges to Produce a Shearing Cut That Leaves No Chatter Marks

and eliminated the pounding, so that we could use a much faster feed without producing chatter marks.—Contributed by H. G. C., Washington, District of Columbia.

Remedy for Swollen Feet

The workman who must do his work standing in a shop where floors are moist and sometimes hot, finds that his feet become swollen and irritated. This can be prevented by rubbing glycerin into them each night and then, before work each morning, coating them quite thickly with warmed paraffin all over and between the toes. This increases the comfort and general health of the workman.

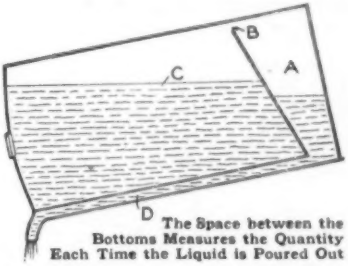
Coal-Bucket Chute to Prevent Spilling the Coal

The annoying part of pouring fuel into a stove from a coal bucket is that a part of the coal will spill over the sides of the bucket. This may be easily prevented by cutting the metal chute in the shape shown in the sketch. This will provide sides that will prevent the pieces of coal from falling on the floor.—Contributed by K. W. Browning, Salt Lake City, Utah.

A Measure within a Liquid Receptacle

The sketch shows the construction of a can from which only a certain amount of liquid can be poured out, although it may hold many times that quantity. The can may be of any shape desired. At a distance above the bottom of the can on the inside is placed another bottom in a sloping position as shown. The opening to admit the liquid into the space A between the bottoms is at a point diagonally opposite the outlet, or at B. The liquid in the main part of the can C runs through the hole B and fills the space A. When tipping the can to pour out the liquid, only that portion contained in A can run out through the spout D. The distance between the bottoms determines the amount of liquid in the measuring portion A.

If it is desired to measure a pint of liquid at a time, the location of the dividing bottom may be determined by placing a pint of liquid in the can and tipping it to obtain the slope, then marking the level line on the sides of the can.—Contributed by J. A. Scalella, Philadelphia, Pa.



The Space between the Bottoms Measures the Quantity Each Time the Liquid is Poured Out

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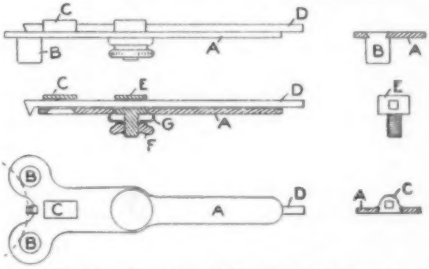
Center Gauge for Round Stock

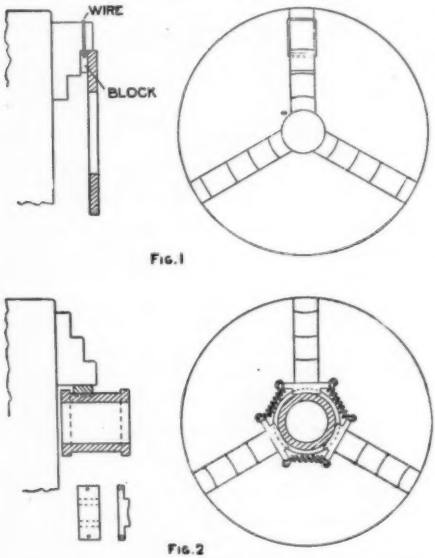
A gauge for locating the center of a round shaft, or any round stock, can be made as follows: The base or plate A is cut from mild steel and fitted with two stationary pins, BB, which are cut from cold-rolled steel rod. A guide block, C, has a square hole for the marking bar D, and is riveted to the plate as shown. The adjusting device consists of a bolt, E, having a square hole in the head for the marking bar, a thumb nut, F, and a cupped washer, G, for clamping the bar tightly. The tool may be used in marking round stock as well as for a center gauge.—Contributed by P. T. Martin, Vancouver, B. C.



A Tool for Gauging and Marking the Location for the Centers on Round Stock

Steel Blocks for a Lathe Chuck

When holding a thin disk in the outer ends of the jaws on a chuck it is almost impossible to keep the sur-



Methods of Using Blocks in a Lathe Chuck to Hold Thin Disks and Flange Bearings

face true without something between the disk and the seat of the jaws. Sized pieces cannot be placed behind the disk unless some means are provided to hold them in place. This may be accomplished by attaching a wire to the pieces as shown in Fig. 1.

Another method of using steel blocks is shown in Fig. 2. These blocks are used for holding flanged bearings. The number of blocks necessary depends on the number of jaws in the chuck. The blocks are joined together with coil springs. The method of using them is clearly shown in the sketch.—Contributed by F. H. Mayoh, Pawtucket, R. I.

¶After installing a magneto for a motor, be very careful in starting the engine, as a slight change in the setting will cause the engine to kick with serious results to the operator.

To Repair the Bottom of a Ship

While cleaning the bilges in a torpedo-boat destroyer, four loose rivets were discovered in the bottom near the keel, and as this allowed water to leak into the ship, it was necessary to replace the rivets with new ones. The rivets were far down along the hull and, with no diver at hand, the job appeared to be a difficult one. The repair was made in the following manner:

A chisel bar and sledge were procured with which the heads of the rivets were cut off, the remaining parts being then punched out and the holes stopped with pine plugs. It was decided to put the bolts in from the outside in order to tighten the nuts from the inside. About 100 ft. of 1-in. rope was procured and weighted in the middle by tying on about 7 ft. of ⅜-in. chain. This was passed under the ship at the bow and was worked along aft by having a man on each side of the ship pulling on the ends of the rope.

After getting the rope back under the port engine room, where the loose rivets were located, the center of another line was tied to one end of the rope and the other end was hauled in while the double line was played out until the center of the double line came up on the opposite side of the ship. The ends of the double line were then spread out and hauled in until the looped end, which was in the shape of a V, was near the rivets.

Meanwhile the bolts were prepared by cutting the thread down to the head and filing the end flat, then drilling a hole through its diameter so that a wire could be attached to hang directly in the center of the bolt. A washer was flared out in the shape of a cup and fitted on the bolt next to the head, and a gommet, made of lamp wicking and red lead, was fitted around the bolt inside of the cupped washer. A spool of copper wire was procured and the end of the wire tied on a round file. One of the wooden plugs was pulled out, and the file dropped through and enough wire played out

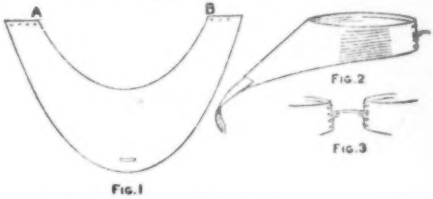
to reach to the boat's deck. The wire and file thus came inside the V-loop of the rope. To bring the wire up it was only necessary to haul in on the ends of the double line and play out the single line on the opposite side of the ship. The file was then removed and a bolt tied in its place. By hauling the wire back into the ship through the rivet hole, the bolt was brought into place and the nut screwed on the threads. The surplus length of the bolt was then cut off and the bolt secured in the usual manner. The other loose rivets were replaced in the same manner.—Contributed by A. O. Corwin, Charleston, S. C.

Clip for Holding Tool Checks

The workman in a shop where there is a tool-check system will find a safety pin a very useful article to keep the checks together in a handy place. It is not necessary to have a buttonhole and a hook for them, as they can be pinned together and attached to the lapel of a shop coat or in any convenient place. The checks are always at hand and are not apt to be lost or mislaid, and an inventory of the tools and checks can be made at any time.—Contributed by Henry J. Marion, Pontiac, Mich.

Goggles for the Motorcyclist

In making the goggles shown in the sketch the oval glasses were taken from a discarded pair of rubber goggles. The glasses each measured 1 by 1⅜ in. A piece of leather was procured and two pieces cut out, as shown in Fig. 1. The inside edge from A to B should measure ⅛ in. less than the outside edge of the glass. On the inside, and $\frac{1}{16}$ in. from the edge, cut a V-shaped notch with a sharp knife from A to B, to hold the lens, then sew the ends together to form the shape shown in Fig. 2. A link was then made, as shown in Fig. 3, to fit over the bridge of the nose. The link

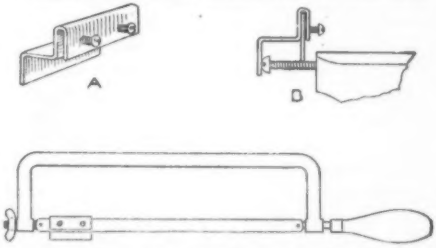


Pattern for the Leather Protector and Its Finished Shape to Receive the Eyeglass

was constructed from a small piece of copper wire. The edges of the leather are smoothed with sandpaper and then rubbed with the smooth end of a stick while wax is applied. The head strap is made of an elastic. The goggles can be nested and slipped into a pocket when not in use.—Contributed by J. H. Sanford, Pasadena, Cal.

Guide for a Hacksaw Blade

Cutting a screw with a hacksaw to make it shorter is a very tedious and unsatisfactory method, as the teeth of the saw blade are liable to jump over a thread after making the measurement so that the screw will be cut either too long or too short. If there are many screws to be cut a certain length, make a gauge, as shown at A, for the saw blade and all screws will be measured and cut alike. The gauge is fastened on the front end of the saw

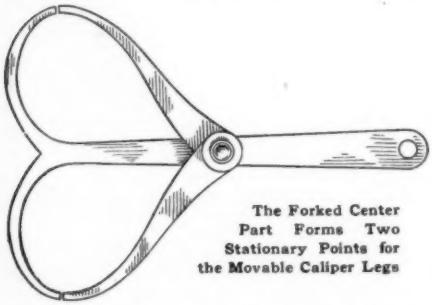


The Gauge as It is Attached to the Saw Blade at the Front End

blade and used in starting the cut, as at B, after which the cut is finished in the usual manner.—Contributed by Joe V. Romig, Allentown, Pa.

Double Calipers

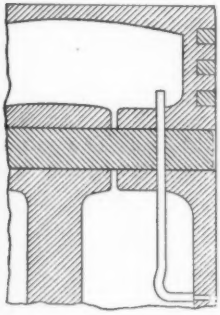
A double caliper, especially adapted to carry a width as well as a thickness measure, is the invention of a correspondent of the Blacksmith and Wheelwright. The main part of the caliper is 12 or 14 in. long. The other parts are similar to ordinary caliper parts. Two measurements can be had at one time.



The Forked Center Part Forms Two Stationary Points for the Movable Caliper Legs

To Keep a Wrist Pin in Place

The wrist pin in the piston of a gasoline engine is apt to work out of place and score the walls of the cylinder, and set-screws for holding these pins in place will work loose and drop into the crank-case where they will cause considerable damage before the engine can be stopped. A very practical method of locking these pins in place is shown in the sketch. A ¼-in. hole is drilled through the bearing and the pin, and a smaller hole in the side of the piston. Then make a pin of a drill rod, with one end bent at right angles, as shown, and a shoulder filed on it to fit the smaller hole in the piston side. The shoulder prevents the end of the rod from touching the wall of the cylinder. The rod is easily slipped through the hole and sprung into place. The pin cannot come loose by the jar of the engine and it can be easily removed when necessary.—Contributed by Chas. Kaufmann, Santa Ana, Cal.



Sharpening Clipper Blades

Sharpening clipper blades is, in the opinion of many users, a task which demands the services of an expert and the facilities of a factory. It is true that no little skill is necessary, but with simple tools and a little practice any person of intelligence can do a satisfactory job which is of no little value when the users of clippers are far out in the country.

The two essential things are a supply of emery, about No. 000 or even finer, and a lapping board. The latter is a piece of cast iron which should be at least 6 in. square, planed perfectly flat on one surface, which has a series of small grooves cut in it, the grooves being little more than deep scratches. The surface is "charged" by sprinkling a very light coat of emery over it. Take out the clipper blades and lay them, one at a time, face down, on the emery surface of the metal, and grasp one firmly with the fingers of both hands. Rub them back and forth on the emery surface, applying fairly heavy pressure meanwhile. Great care must be exercised not to tip the blades when pushing them. Keep them perfectly flat at all times when on the emery surface.

After the board is once used, it will not need to be so heavily charged with emery, as the flat part of the cast iron retains minute particles, and the grooves a greater quantity.

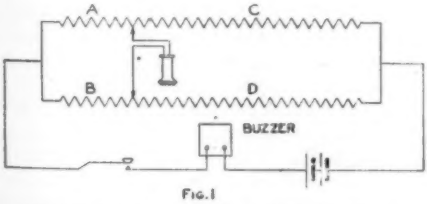
Such an outfit can be procured for less than $1, and once made up will last for a long time. With this outfit at hand there is no need of running dull clippers, as the blades can be taken out quickly and sharpened in a few minutes.—Contributed by Donald A. Hampson, Middletown, N. Y.

¶An aerial for wireless should be made of copper or aluminum.

How to Make an Electrical Water-Level Indicator

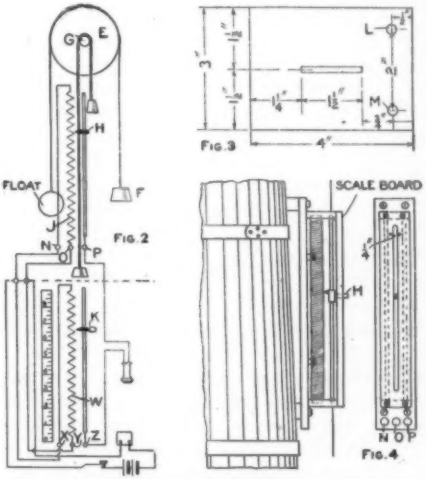
A simple water-level indicator that may be used in determining the height of water in a tank or basin that is located some distance from the pumps, controlling devices or engineer's office, may be constructed at a very small expense.

The principle upon which the device operates is that of the Wheatstone bridge, which is briefly as follows: Two resistances are connected in parallel forming a divided circuit, and a battery is connected through a switch to this divided circuit, as shown in Fig. 1, and supplies current to the branches when the switch is closed. A current-detecting device, such as a galvanometer or telephone receiver, is connected between two points that are located on the two branches respectively. No current will exist in the galvanometer or telephone-receiver circuit when the resistances of the two left-hand portions, A and B, of the two branches bear the same relation to each other as exists between the resistances of the two right-hand portions, C and D, of the two branches. If one of the connections of the current-detecting device be moved along the branch to which it is connected, a current will pass through the galvanometer or receiver, and the other connection must be moved to a corresponding position on its branch before a balance is again established. In other words, the two



The Principle of the Wheatstone Bridge, Which Locates the Position of the Pointer by Sound

connections of the current-detecting device must occupy corresponding positions on their respective branches, which results in their electrical pressure being the same and no current will flow in the circuit connecting them. Thus, if the upper contact is in



The Parts as They are Connected to a Tank for Indicating the Water Level Within

the center of the upper branch, the lower contact must be in the center of the lower branch; if one-third of the resistance of the upper branch is to the left of the upper contact, one-third of the resistance of the lower branch must be to the left of the lower contact, and so on, in order that a balance be obtained.

Now, if one of these branches or resistances be so located that the position of the galvanometer or receiver connection is controlled by some water level, through the medium of a float, pulleys and wires, and the second resistance located where it is desired to know the water level, the two being connected by the proper leads; then the combination will constitute a simple device for determining the water level, the position of the contact on the second resistance being controlled by the observer. A schematic diagram of the connections is shown in Fig. 2. The large pulley E is mounted on a shaft in such a position that a piece of small brass cable

will pass over it and one end hang down inside the tank and the other end outside. The end inside the tank is attached to a float, and the outside end to a weight, F. A smaller pulley, G, is mounted on the same shaft as the large pulley E. The contact H is moved up and down along the resistance J by means of a wire which is attached to it and passes over the pulley G. The two weights may be dispensed with by passing the wire around a small pulley at the lower end of the resistance and attaching both of its ends to the piece carrying the contact. The wire controlling the contact H passes over the pulley G in such a direction that the contact always moves in the same direction as the float. The contact K is controlled by the observer, and its position is determined by adjusting for no deflection of the galvanometer or a minimum hum in the telephone receiver. A pointer may be attached to each of the pieces carrying the contacts H and K and arranged to move over a properly marked scale so that the level of the water may be read directly in feet.

The following more or less detailed description of how to build the complete device may be of interest to some of the readers: The apparatus located at the tank is practically a duplicate of that located at the indicating end, and for this reason the construction of the equipment at only one end will be described. Obtain a piece of well seasoned ¾-in. hardwood board, 4 in. wide and 30 in. long, round off the corners and edges on one side and give it several coats of shellac. Cut two pieces from some well seasoned ½-in. hard wood, having dimensions corresponding to those given in Fig. 3. Drill two ¼-in. holes, L and M, and cut a groove ⅛ in. wide in each of those pieces, as indicated in Fig. 3. The holes and groove should not be cut all the way through, but to a depth of about ⅜ in. only. Obtain a ½-in. board, 3 in. wide and 27 in. long. Cut a ¼-in. slot in the center of this piece to within 1 in. of each end. Now arrange to mount this piece, which we will call the scale board, on top of the base by screws which pass through its ends into the supports, these being in turn fastened to the base by screws from the under side. The upper support should be 1 in. from the end of the base and the lower support 2 in. from the lower end of the base. The supports should be mounted so that the holes and grooves in them will all be on the inside. Get two ¼-in. brass rods of such a length that they will reach from one end support to the other and extend into the ¼-in. holes; also get a piece of ⅛-in. rubber or hard fiber, 1½ in. wide and of the same length as the brass rods. The resistance is to be wound on this piece of insulation, which may be done as follows: Take a three-cornered file and cut a number of shallow grooves on each side of the piece of insulation, spacing them equally and about $\frac{3}{32}$ in. apart. Obtain a small quantity of bare resistance wire, preferably manganin, about No. 24 gauge and wind it around the piece, placing each turn in a separate groove. The winding should not be nearer the end than ¾ in., and the ends of the wire may be fastened by weaving them in and out through several small holes drilled in the ends of the piece of insulation. Three binding posts should be mounted on the lower end of the base, as indicated by N, O and P in Fig. 4. Cut out two small blocks and saw a notch in each of them so that the piece of insulation upon which the wire is wound will fit into the notch, and then mount these blocks on the base, as shown in Fig. 4, to serve as supports for the resistance.

The sliding contact may be made as follows: Obtain two pieces of thin sheet brass, 1¼ in. by 2¾ in., and bend them into the form shown in the end view, Fig. 5. Get a piece of thin spring brass, about ½ in. wide and 2 in. long, and bend it into the form shown by Q in the side view, Fig. 5. This spring and the two larger pieces of brass should now be fastened together by two small rivets, R and

S. Two small holes, T and U, may be drilled, as indicated in the sketch, to be used in fastening the wire that is to move the contact. A piece of $\frac{7}{32}$-in. round brass should now be fastened at the point V. It, no doubt, would be best to solder this piece in place and it should be long enough to project at least ½ in. above the surface of the scale board, as shown at H, Fig. 4. The various parts may now be assembled, and a small hole drilled in each end support through which to pass the wire that is to move the contact. The end supports and scale board should be given several coats of shellac before assembling.

The pulleys E and G should be of such diameter that the movement of the float from high to low-water level will cause the contact H to move from about 1 in. from the upper end of the resistance to within about 1 in. of the lower end. A scale may then be marked off and mounted on the surface of the scale board so that the position of the float may be indicated in feet.

The contact K may be moved by a small handle attached to the piece of brass projecting through the slot in the scale board. A second scale should be constructed, identical with the first and mounted in exactly the same position with respect to W as the first scale with respect to J. It should be remembered that the two resistances, J and W, must be identical, and for this reason it would, no doubt, be best to file the slots in the pieces of insulation upon which the wire is wound at the same time, they being clamped side by side between two pieces of board. It is also necessary that both resistances have the same number of turns. It might be well to mark off the second scale by placing the contact H in various positions and noting the position of the contact K which gives a balance. All connections must, of course, be made permanent before marking this second scale.

An ordinary buzzer is connected in the battery circuit to interrupt the current, which will produce a hum in the telephone receiver. The hum will, of course, be a minimum when the point giving the nearest balance is

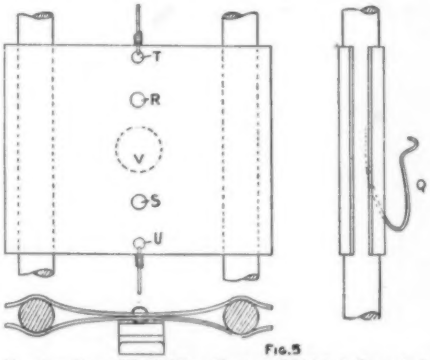
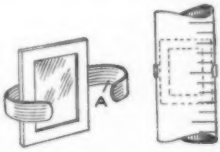


Fig. 5
Construction of the Sliding Contact Which is Operated by the Float and Pulley Arrangement

reached. The battery is connected to the leads midway between the two resistances J and W so that the same length of leads will be introduced into each branch. This will not be necessary, however, if the second scale is marked off by noting the points of balance, which no doubt will be the safest way in the end. The battery may then be connected to the points X and Y.

To Prevent Parallax in Reading Burettes

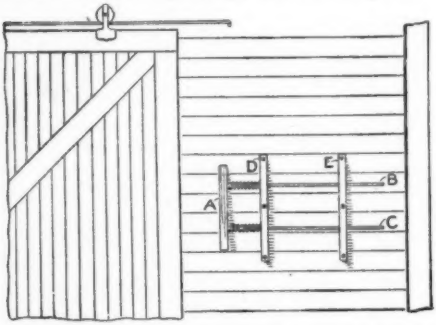
Under ordinary conditions it is very difficult to make an accurate burette reading. A simple contrivance which makes the reading an easy matter is one in which a small mirror is used. As shown in the sketch, the mirror is inclosed in a small frame having two clips, arranged as at A, by which it is held to the burette.



A fine wire, stretched across the mirror, is used to mark the point where the meniscus and its image in the mirror are directly opposite each other. —Contributed by Spencer M. Gowdy, University of Pennsylvania.

Recoil Spring Buffer for a Sliding Barn Door

Large sliding doors have a tendency to jump the track when they are thrown open quickly. This may be



The Buffer Stops the Sliding Door Before the Wheel Strikes the Stop on the End of the Track

prevented by using a recoil spring to stop the door at the place where it is entirely open. A buffer or recoil spring can be easily attached to the outside of the building wall as shown in the sketch. The buffer A is fastened on the ends of two sliding pins, B and C, each 1 in. in diameter and 18 in. long. The pins slide loosely through holes bored in the pieces D and E, which are 2 in. square and 14 in. long and fastened permanently in the right location. Two strong spiral springs are placed on the pins between the buffer head and the piece D.—Contributed by J. Harry Priestley, Lawrence, Mass.

To Use a Bent Drill

When a drill wabbles as it turns with a chuck, either the drill is bent or the chuck jaws are not true. With the point of the drill moving in a circle, it is difficult to start it in a center-punch mark. A method of doing this, which is not commonly known, is to stop the machine and bring the point of the drill down in the punch mark and hold it there with the lever while the machine is started. The spring of the drill and machine spindle allow the point to enter the punch mark straight. The proper thing to do would be to correct any existing error, but time and other conditions sometimes prevent the making of the repairs.

An Adjustable Prony Brake

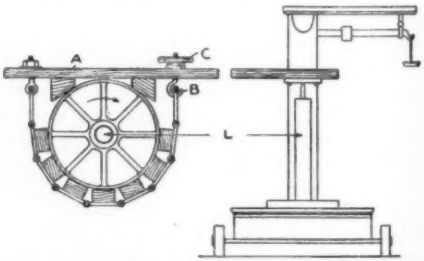
The simple brake depicted in the accompanying figure can be easily constructed at a very small expense and will prove quite serviceable in testing small motors, gas engines, water turbines, and other power engines.

The following equation is used in calculating the output of the machine under test:

$$\text{Hp.} = \frac{6.2832 \times \text{W} \times \text{L} \times \text{r.p.m.}}{33{,}000}$$

In this equation, W is the scale reading in pounds; L, the horizontal distance from the center of the shaft to the point where the brake arm rests upon the platform of the scale; r.p.m., the revolutions of the pulley per minute; 33,000, the number of foot pounds of work that must be done per minute in order to develop one horsepower, and 6.2832 is twice π (π is the number of times the diameter must be laid off to reach around a circle) and is called the angular velocity.

The arm A of the brake should be made from a piece of well-seasoned oak, and its size will of course depend upon the output and speed of the machine to be tested. Let us assume that it is desired to determine the exact output of a motor that is rated at 10



Application of a Prony Brake to Scales, to Determine the Horsepower of Motors, Engines and Turbines

hp. when operating at 1,000 revolutions per minute.

Substituting the value 10 for the

horsepower in the above equation, and 1,000 for the r.p.m., we find the value of W × L is equal to 52.5. That is, the product of the length L and the weight W, which is called the torque or turning moment, is equal to 52.5. Now if the length of the brake arm L be 2 ft., the weight W will be 26.25 lb. or there will be a force of 26.25 lb. acting on the brake arm when the output is 10 hp. and the length of arm is 2 ft. In this manner the approximate force the brake arm must be capable of withstanding can be estimated and the arm dimensioned accordingly.

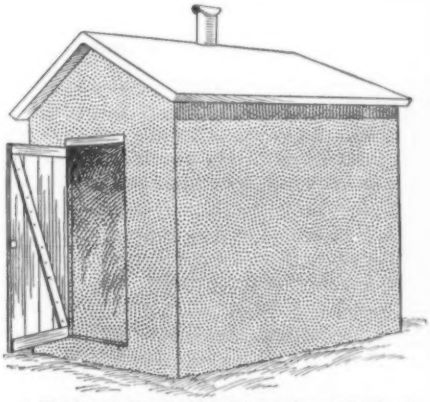
It would no doubt be best to use a piece, at least 2 in. by 4 in., in testing the above motor.

The band of the brake is made of malleable sprocket-chain links of the detachable variety. A number of wooden blocks are rigidly fastened to a number of links of the chain, and two blocks are fastened to the under side of the brake arm A, as shown in the sketch. One end of the chain is fastened to the brake arm and the other end is held by a hook, B, which can be raised or lowered by means of the small hand wheel C, and the pressure of the blocks upon the pulley varied. It is apparent that such a brake can be adjusted to any size pulley by simply removing or placing more links in the chain. A number of holes may be drilled in the brake arm to accommodate the hook B, and its position can then be changed to correspond to the pulley in use.

To Build a Reinforced-Concrete Smokehouse

Many people continue the practice of smoking and preserving meats on their own premises, preferring the appetizing results of the old way to the modern chemically treated product, says Concrete-Cement Age. And when it comes to ways and means to insure the best results, concrete as usual takes first place. A smokehouse should retain the required quantity of smoke, exclude flies and other vermin and should be fireproof. A building of concrete has all these good qualities as well as being thief-proof.

In constructing such a house ordinary lumber may be used for forms.



A Thief and Vermin-Proof Smokehouse Built of Reinforced Concrete Throughout

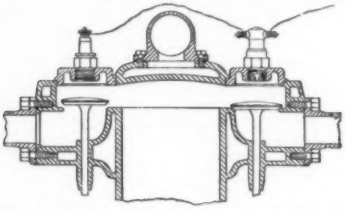
The walls for a 5-ft. by 8-ft. building should be 4½ in. thick and rest on a foundation, 8 in. wide and 2½ ft. deep. The roof and floor should be 3½ in. thick. The inside form is made first, then the outside erected, layer by layer as the concrete is placed, thus avoiding much heavy lifting and giving perfect control of the reinforcement. The wall reinforcement consists of ⅜-in. rods, 8 in. long, spaced 18 in. in either direction. Similar rods laid flat in the concrete, and upon the inside and against the other rods are carried around the building, being bent around the corners and hooked together where they meet, thus making a very secure job. In constructing the roof, nail 2 by 4-in. rafters to the uprights of the inside forms, placing them 1 in. below the bottom of the concrete roof, the pitch being 1½ ft. The rafters are sheathed with 1-in. boards and the work of laying the concrete begins at the cornice. The boards and studs must not be too close-fitting, to avoid damage from the swelling of the lumber by dampness.

The amount of material necessary to construct a house of the dimensions given would be approximately 10 bbl. of cement, 3 cu. yd. of sand, 6 cu. yd.

of crushed rock or screened gravel, and 55 pieces of ⅜-in. rods, 8 ft. long. Heavy woven wire could be used for reinforcing the walls and for the long way of the roof.

Dual Ignition for a Gasoline Engine

A dual ignition may be applied to automobile engines having an opening on both sides of the cylinder at the expense of only an extra set of double

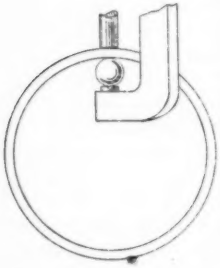


Spark Plugs as They are Fitted to an Engine to Produce a Dual Ignition

spark plugs. The points on each double spark plug are bent together partly and used in place of the ordinary spark plug. The single spark plug is turned into the place of the priming cock. Make the connections as shown, and a spark will be produced on each side of the cylinder.—Contributed by H. C. Ringle, Cambridge, Ill.

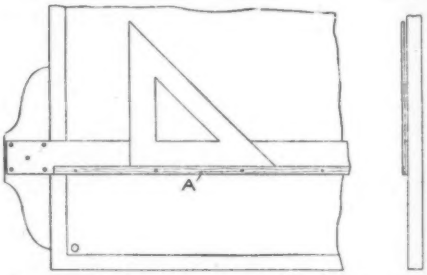
Measuring the Walls of Tubing

For ordinary purposes a 2-ft. rule is accurate enough to measure the walls of tubing, but when it comes to making accurate fits some other procedure must be adopted. It is a simple matter to measure the outside diameter with calipers or a micrometer, but good inside measuring tools are not always at hand. Instead of measuring the inside diameter directly, the thickness of the wall may be measured and the former calculated. Owing to the concavity of the inner wall, a micrometer applied directly to it will not give a true reading, but by placing a ball between the anvil of the micrometer and the tube wall, the exact thickness is obtained by subtracting the diameter of the ball from the reading. A short, straight piece of wire will do as well, as it, too, gives a point contact, but it must be kept perfectly parallel with the tube.



To Prevent Smearing Freshly Inked Lines on a Drawing

The smearing of freshly inked lines with the triangle was prevented by a correspondent of American Machinist in the manner shown in the accompanying sketch. A small strip, A, ⅜ in. wide by $\frac{1}{16}$ in. thick and as long as the T-square will accommodate, is fastened with screws to the lower edge of the T-square. The triangle or protractor is placed against the strip



The Triangle is Carried as High above the Paper as the Thickness of the T-Square and is Kept Square against the Strip

which keeps it square, and the blade of the T-square prevents the tool from touching the work.

To Hold a Welding Heat in Metals

To keep the iron or steel ends, to be joined by a weld, at a welding heat long enough to make the weld can be accomplished by applying a jet of compressed air upon the heated parts, as soon as they are taken from the fire. The result effected is that it enables the operator to hold a welding heat until the pieces are completely joined.

In forging machine work, the weld-

ing heat is quite often lost. This is due to the length of time required to place the iron in the dies. This difficulty can be readily overcome by fastening the air hose to the machine in such a manner as to permit the air flow to come in contact with the heated metal while it is being placed in the dies.—Contributed by Geo. H. Rau, Jr., Cleveland, O.

An Electric-Wire Gripper

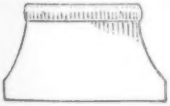
The gripper is a simple device and can be easily constructed as shown in the sketch. Two pieces of oak, 10 in.

The Wire is Tightly Gripped between Two Pieces of Wood When It is Pulled with a Tackle

long, 1 in. wide and ¾ in. thick, are linked together with four pieces of metal, two of them 4 in. long, and two, 6 in. long; all being ½ in. wide and ¼ in. thick. Large screws or bolts are used to connect the parts. A bolt is run through the ends of the two long pieces of metal at A. The tackle is connected to this bolt and the end of the wire placed between the pieces of wood. As the tackle pulls on the device, it grips the wire tightly without danger of damaging the insulation on the wire.—Contributed by Jas. E. Noble, London Junction, Ont.

A Painter's Guard

When applying paint on woodwork adjoining wallpaper or glass, it is well to have a guard of some sort to protect the paper or glass, as the paint may then be applied more quickly and with better results. Such a guard can be easily made of sheet iron, 3½ in. wide and 5 in. long, cut as shown in the sketch and fitted with a wood handle. The handle can be cut from an old broom stick, one side being grooved to receive the shorter edge of the metal.



Duct Plugs

The sketch illustrates two styles of duct plugs which are a great help when placing 3-in. iron pipe or multiple-duct

Plugs for Temporarily Filling the Ends of Ducts in Ditches While Doing Construction Work

tile. The round plug A is used to prevent dirt, stones, sticks, etc., from entering and obstructing a 3-in. iron pipe for telephone or power-cable work, while the one shown at B is used for the same purpose with vitrified-clay ducts, 3¼-in. square. The edges of the square plug must be chamfered a little to fit the rounding corners of the opening in the tile.

Check for a Shop Door

A very serviceable check for a shop door can be easily made as follows: A piece of ⅛-in. drill rod is filed flat on two sides, beginning at a point 5 in. from one end. Then a slot, A, is filed ½ in. below the flattened part, and the lower end of the rod is pointed, as shown in Fig. 1. The check is fastened to the door with two screweyes placed below the spring B, as shown in Fig. 2. A third screweye, C, somewhat smaller than the other two, is filed to fit over the flat part of the rod. After being opened it is screwed into the door at the proper place. The rod is then inserted through the screweyes, and the open one closed around the rod with a pair of pliers. The spring B, which fits into the slot A, is ½ in. wide. By pushing the spring in, the rod drops of its own weight and the pointed end holds the door. When the

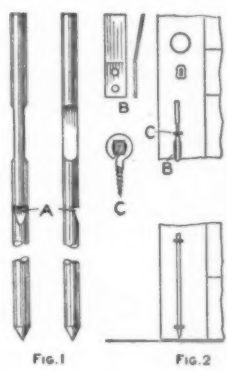
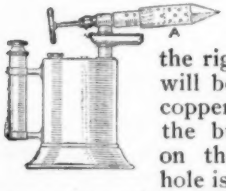


Fig. 1 Fig. 2

rod is pulled up, the spring catches in the slot, holding it in place, and the door is free to be moved. The door may be moved while the rod is down if small holes with slanting approaches are made in the floor and the end of the rod filed flat instead of pointed.—Contributed by J. E. Morrison, Steelton, Pennsylvania.

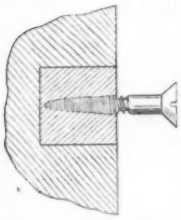
Copper Soldering Point on a Blowtorch

The ordinary blowtorch, with the burner end equipped with a copper point, makes an excellent soldering device. The point can be easily kept at the right heat and there will be no want for hot coppers. The end of the burner is threaded on the outside, and a hole is drilled in the copper point and threaded to match. Small holes are drilled in the copper in the same manner as in the burner to make vents for the flame.—Contributed by John Gerrer, El Reno, Okla.



To Hold Screws in Concrete Walls

The usual wood plug driven into a hole drilled into a wall may be replaced to advantage by the device shown in the sketch. The threads of the screw are wrapped with fine wire, which is usually made of soft metal, and this is pushed into the drilled hole after filling it with fresh cement mortar. The cement fills the interstices in the iron-wire wrapping, and after it has set, a permanent threaded hole is provided and the screw can be removed and reinserted any number of times without wearing out the threads.



Substitute for Lead or Oakum Joint

In doing some plumbing on the ranch we ran short of oakum. As for lead, it had been forgotten altogether in ordering the supplies. There was no time to go after them, so we had to do without both. We procured some old hemp baling rope and pulled it all to pieces, then rolled it into loose strands the size of large cords. This we dipped in white lead and oil and wrapped it around the pipe, driving it down with a packing tool. It made a good tight joint, and seems to be lasting just as well as the regulation lead and oakum.—Contributed by H. J. Blacklidge, San Rafael, Cal.

A Fountain Marking Pencil

The pencil is made of a piece of brass tube, A, fitted with turned brass ends, B and C. The marking end B consists of a steel ball, D, as a valve, which is kept pressed tightly to its seat with a coiled spring E. The parts holding the spring in place are shown at F.

A Marking Pencil Having a Large Capacity for Fluid Which is Kept from Evaporating

The end C constitutes the cap and vent and is fastened to the tube with a pin, G, sliding in a notch as shown. When the cap is turned to the right, the pencil is closed, and a turn to the left causes the vent hole H to coincide with the hole in the cap apron, and it is ready for writing. A slight pressure of the pencil will force the ball D away from its seat and allow the fluid to flow.—Contributed by C. Cain, College Point, N. Y.

Hints on Babbitting

Babbitt is ready to pour when it will ignite a light pine stick—a greater heat injures the babbitt. Always provide means of escape for the air. The air must go out before the babbitt enters. If possible, heat the casting to receive

the babbitt. This not only saves chilling the molten metal, but it lessens the relative contractions of the casting and the babbitt, making the latter a closer fit. Small castings can be heated in a fire and large ones heated with a blowtorch.

Always provide a liberal head for the mold to draw from, especially on large jobs. Unless this is done, a shrink hole is almost sure to form at the top.

The best way to remove old babbitt is to put the box in a fire and melt it out. When this is done the box should not be put in water to cool. Water should never touch any parts being babbitted. This is the first rule to observe for personal safety, and the second is to wear goggles to protect the eyes.

A Mop Water Tank

The janitor mopping a large floor space wastes considerable time in procuring clean water or washing out his mop. The small amount of water carried in a pail will not be enough for a very large floor. One janitor overcame this difficulty by making a tank with two compartments, one for clean water, the other for the dirty water wrung from the mop.

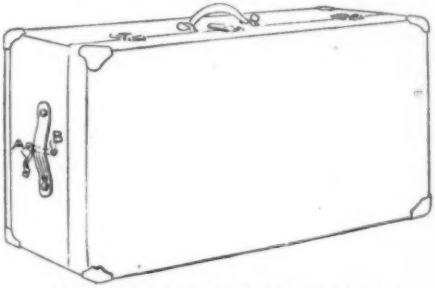
A Mop Tank with Divisions for Clean and Dirty Water, and Mounted on Wheels

Another feature of the tank is that it has wheels like a truck, so that it can be easily drawn to any part of the floor.

¶An igniting magneto should not be jarred unnecessarily, as this tends to reduce the magnetism.

Handle on the End of a Suitcase

The traveling salesman or anyone who must carry a suitcase in crowded cars will find it a great advantage to



A Suitcase with an End Handle to Carry It Upright in a Crowded Car

have an extra handle attached to the end of the suitcase. The handle should be fastened in such a manner as to make it lie flat on the case when not in use. This may be done as shown in the sketch. The small strap A draws the handle flat and is fastened with an ordinary glove clasp, B.—Contributed by J. G. Davis, Patterson, New York.

Cleaning Spark Plugs

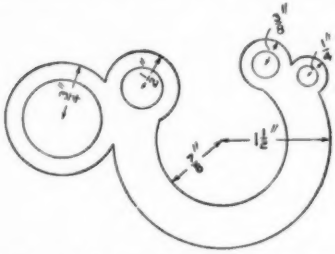
A good way to clean the mica part of spark plugs in gas engines, so as to leave no carbon, is as follows: The entire plug is placed in a glass of vinegar or a weak solution of acetic acid. If the latter is used, a 10-per-cent solution is best. After the plug is taken out of the solution, it should be washed in gasoline and rubbed with a dry cloth. This removes the carbon deposits and grease quickly.

Removing Old Wall Paper

A good and effective way to remove old wall paper is to make a solution of paste or flour in water. To this pasty solution, add a few ounces of baking soda and apply freely. After a few minutes the paper can be removed in large-sized strips without dust or dirt.—Contributed by Loren Ward, Des Moines, Iowa.

Template for Draftsmen

The template shown in the illustration is a very handy instrument for the draftsman when working on pattern-



Regular Curves Cut on Different Radii for Drawing in Fillets on Pattern-Shop Drawings

shop drawings. Small regular curves can be readily drawn in without the use of a compass. The instrument is made of fiber, but may also be cut from celluloid about $\frac{1}{16}$ in. in thickness. —Contributed by H. C. Dixon, Johnstown, Pa.

To Prevent the Hands from Chapping

A workman's hands are liable to become chapped and sore during the winter, but this may be prevented by using the following composition: Mix ½ oz. of alcohol, 2 oz. of glycerin and 20 drops of carbolic acid and pour it into a bottle. Apply a little of the mixture immediately after washing the hands and while they are yet a little damp, then rub it in thoroughly.

Gauging Automobile Wheels for a Sprung Axle

Some means must be provided by the repairmen of automobiles to determine if the wheels track properly.

The Points are Set to Determine the Distance between the Front and Rear Part of the Wheels

If an axle carrying a pair of wheels becomes slightly sprung, not enough to be noticeable, yet sufficient to cause considerable wear on the tires, it must be straightened, and without the aid of some sort of measuring device, it is improbable that the workman will secure good results. I use a device made on the principle of a beam compass with caliper points. The points can be adjusted to any gauge and are set on the inside of the wheel rims, which are tested all around, if necessary, to determine straightness of axle. —Contributed by T. C. Bevan, Utica, New York.

Extension Electric-Light Attachment

Electricians, tradesmen and persons using an extension electric light on repair work will find the sharp hook attachment, shown herewith, on the side of the globe protector to be a great convenience, as the hook can be pressed into and held in wood on beams, posts, walls, or hung over rods, etc. The hook can be made of bent and sharpened metal and is soldered to the guard.

A Hardening Bath for Low-Grade Steel

A good grade of steel cannot always be obtained for making cold chisels, flat drills, punches and lathe tools, consequently the hardening process must be right to secure an even temper—one that will keep an edge. The following solution will give excellent results on tools having a thin cutting edge and made of low-grade steel. Dissolve 2 oz. of chloride of mercury and 2 qt. of common salt in 3 gal. of soft water—rain or distilled water. Use the solution as in hardening ordinary steel, and the metal will be nicely hardened as well as made tough.

¶A section of a mailing tube, closed at one end with a piece of pasteboard, makes an excellent cover for an office drinking glass to protect it from dust.

Cylinder-Head Patterns

By J. A. SHELLY

In making patterns for steam and water-cylinder heads no difficult molding problems are encountered, but a few hints on the best manner in which to handle this class of work may prove of use to those whose experience has not brought them in contact with it.

In all cases these patterns should be built up of segments, but each segment should not run entirely to the center, as the molder's lifting and rapping iron would soon destroy that part of the pattern. It is better practice to make the central portion, out of which the recess for the piston-rod nut and its corresponding swell is turned, either of a solid or glued-up piece, the size of which is determined by the size of the head. This makes an excellent job, and patterns so constructed will remain straight and true as long as they last. As an example of this form of construction, consider a back head, A, Fig. 1, 24 in. in diameter. A ring, built of three courses of segments, is first glued up and a recess turned in it, whereupon it is removed from the lathe faceplate. The block for the central portion is then screwed to a small chuck and turned to fit the recess in the ring. Glue the block in

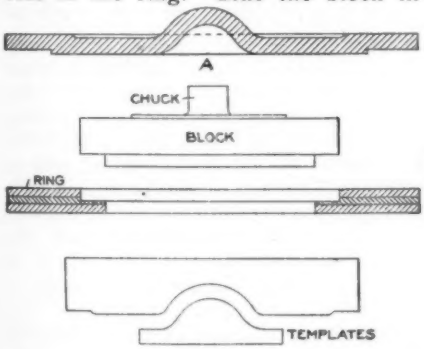


Fig. 1
Cylinder-Head Design and the Successive Steps in Its Construction to Make a Pattern

place, but do not remove the chuck, so that, when the glue is dry, it will be ready to put back into the lathe where the fitting can be turned to caliper size and the nut recess to the template, then finished with sandpaper and varnished. It is well to rough-turn the diameter, but do not finish to

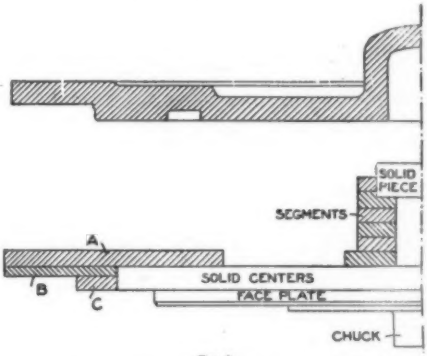


Fig. 2
The Manner of Attaching the Segments to Make a Pattern for a Large Cylinder Head

size, as this can be better accomplished after the piece is rechucked. For rechucking use a faceplate somewhat smaller than the finished head. True it up and turn a recess to fit the fitting piece on the finished side of the pattern, which can then be securely screwed to the faceplate. In finishing the outside, first turn to the proper thickness, then make the swell, using a template to insure the proper shape and an even thickness of metal, and finish by bringing it to the proper outside diameter. All these operations are shown in the sketches, the segment or built-up portions being section lined.

The same method may be pursued in making larger heads of the same general style, but if the nut recess is of the shape shown in Fig. 2, it will be better to core this head, as the wood-turning lathes in general use cannot be speeded up sufficiently high to turn a small, deep hole in a piece of large diameter. It will be seen that this head projects quite deeply into the cylinder, and has a continuous groove on the inner side to accommo-

date the follower-bolt heads. This groove may be turned in the pattern, if it is decided to rechuck it, but if the nut recess is to be cored, it is better

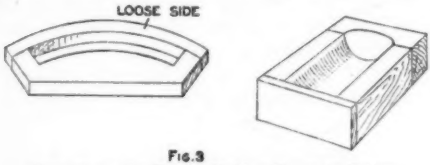


Fig. 3
Core Boxes for Use in Making Cores to Reduce the Building Cost of Large Heads

to core the groove also, thus doing away with the necessity of rechucking. It has the added advantage of being susceptible of alterations. All pump shop patterns are made with this end in view. The plan of building the pattern illustrated in Fig. 2 is not as good as that shown in Fig. 1, but it meets the modern requirements better for cheap work, as the pattern is built in the lathe and finished without rechucking. A faceplate of suitable size is trued up, and the center part or foundation of the pattern is screwed to it. This should be faced off on the outside and trued up on the edge. The segment course A is then applied, using glue and screws or nails to hold them in place. While the glue is setting, proceed to build up the ring in the center to make the swell, using either four or six segments to the course. It is not necessary to wait for the glue to set on this part of the job, as nails may be freely used with the glue to fasten the different courses together. Build this ring to the proper height and turn the recess for the block that makes the top, which should be fitted and fastened in place with glue and nails. Segment course A is then faced off, and courses B and C are fitted in place and fastened. The pattern is then ready to be finished to the drawing sizes. Prints to carry the cores for the recesses on the inner face are fitted to the pattern, after it is removed from the lathe, and the core boxes made as shown in Fig 3. The box for the follower-bolt groove makes a segment core. In this particular case, six cores are required to make the full circle.

It would be a waste of time to describe the making of front heads, as they do not differ in construction from back heads, except that they are fitted with a hub, cored out to take the piston rod and stuffing-box gland.

Imitating Arctic Ice and Snow

By ALBERT OPERTI

This article is the result of a special study made by the official artist of the Peary Expeditions in 1906 and 1907—ED.

The ice of the arctic and antarctic regions is opaque and salt, not transparent. It resembles carrara marble, chalk, or loaf sugar, and is pure white, sculptured into grotesque and fantastic shapes by the agencies of wind, water and heat. Glaciers, icebergs, floebergs, field ice, pancake, and other forms are always opaque.

For museum, panopticon, showwindow, and other purposes, where the ice of the polar regions is to be imitated, the following directions, which are based on field notes, taken with this object expressly in view during two arctic expeditions, may be found useful.

The skeleton over which the imitation covering is to be made is constructed of wood. The ground covering consists of burlap tacked or glued to the wood frame. Plaster of Paris is then modeled over the burlap. When this is dry and hard, a thin coat of plaster of Paris is applied and at the same time powdered mica or bubble glass is sprinkled on and allowed to thoroughly dry, whereupon the whole is varnished with indoor or spar varnish to obtain a wet effect.

Where submerged portions are shown, use plaster of Paris colored with light chrome green, blending down into deeper shades of green. Crevasses and caverns are tinted all shades of blue, emerald green, cobalt, Italian blue, turquoise, Prussian and indigo blue.

Arctic fresh-water ice, which is formed upon glaciers and icebergs, is blue, transparent blue, resembling aquamarine, the semiprecious stone. Puddle glass, treated with aniline dyes in greater or less quantities and modeled with a paddle into shape before it hardens, produces this effect. Artistic modeling and careful work is absolutely necessary.

The fresh-water ice of the arctic can be imitated in another way by using pieces of glass put together and covered with tinted paraffin paper, first inclosing blue-tinted foil paper, which by reflection suffuses the whole interior. Paste the edges of the paper together with fish or gelatin glue, covering the entire surface the second time with paraffin paper. Size the surface with fish glue and sprinkle on plaster of Paris and frosting.

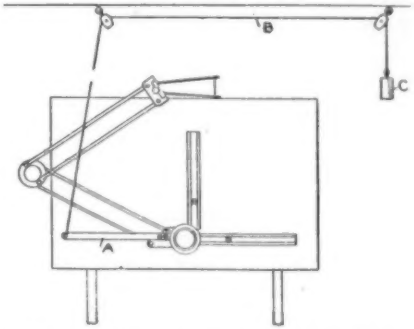
Frozen snow blocks for igloos may be imitated with glass, cut to the proper size and put together and covered with three or four thicknesses of paraffin paper. This should be glued and sized over, and while the size is wet the surface is sprinkled with the following preparation: Sawdust is dipped into zinc white and dextrin or fish glue, and when dry the mass is granulated. This is covered with plaster of Paris and frosting.

Arctic snow is imitated in a similar manner. The sawdust is dipped into zinc white, then thickened with dextrin or gelatin glue and allowed to dry, whereupon the mass is broken up and granulated. Then it is spread over the surface of the exhibit and sprinkled with plaster of Paris and frosting. This, in turn, is sprayed with a sizing of thin gelatin glue with the use of an atomizer.

Icicles may be shaped from puddle glass, then coated with size and sprinkled with plaster of Paris and frosting, or they may be covered with hot paraffin, and alum or borax. To aid in the work of securing almost exact imitations, photographs should be procured of glaciers, icebergs, floebergs, and all other forms of arctic ice and snow.

A Drawing-Machine Hanger

The drafting machine is quite an unhandy instrument to handle on a drawing board, especially so, if the

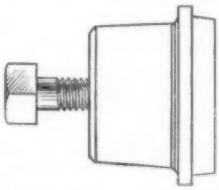


The Drawing Machine can be Instantly Raised for Using Other Instruments on Some Part of the Work

regular drawing instruments are to be used from time to time. The best way to handle this machine is to hang it from the ceiling and have a counterweight to keep it balanced. An arm, A, is attached to the instrument and a line, B, attached to the arm, then run over pulleys fastened to the ceiling. The opposite end of the line is weighted, C, to balance the drawing machine in any position.—Contributed by W. R. Humelbaugh, Buffalo, N. Y.

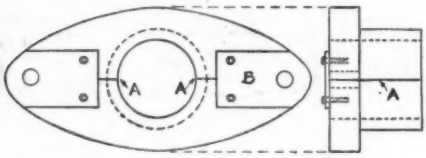
Locking a Nut on a Vehicle Axle

The nut on a vehicle axle can be prevented from working loose and becoming lost by locking it in place with a setscrew as shown in the sketch. A hole is drilled through the center part of the nut and tapped to receive an ordinary set or cap screw. When the nut is turned up in position, the screw is set tightly against the end of the axle. This acts as a lock and prevents the nut from turning loose.—Contributed by G. H. Holter, Jasper, Minn.



Split Gland for a Stuffing Box

A split stuffing-box gland, designed so as to permit quick removal, is shown in the accompanying illustration, which is taken from Power. The gland is of the ordinary type, sawed through the center lengthwise as shown at A.

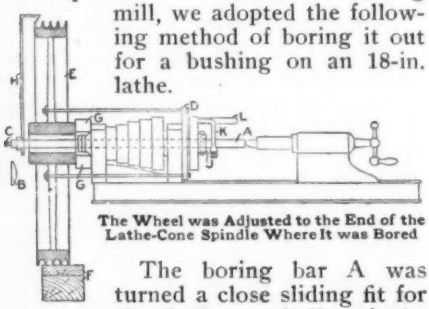


The Ordinary Gland is Split through the Center to Make Its Application Easy

To secure the two sections after they are placed on the piston rod, two iron-reinforced plates are made and drilled as shown at B. The larger holes are for the passage of the gland studs, and the two smaller ones for two bolts, which screw into holes drilled and tapped in the face of the gland.

Boring a Large Wheel on a Small Lathe

A 48-in. sheave had become so badly worn in the hub from running loose on the shaft that it wabbled and threw the rope off. As we had no boring mill, we adopted the following method of boring it out for a bushing on an 18-in. lathe.



The Wheel was Adjusted to the End of the Lathe-Cone Spindle Where It was Bored

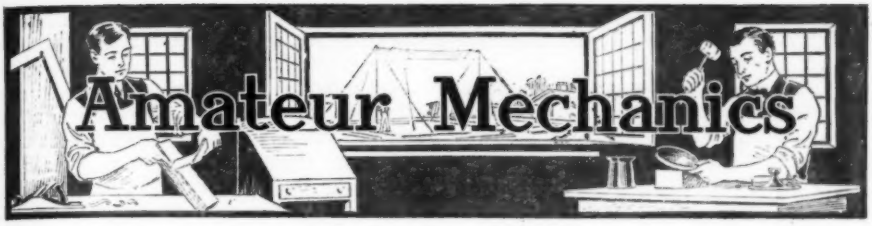
The boring bar A was turned a close sliding fit for the hollow spindle of the lathe headstock. It was slotted near one end for a boring tool and a double-pointed tool, B, was made to fit the slot. The tool was held by a setscrew, C. A plate, D, was made with a hole in the center large enough to slip over the spindle and bearings which projected from the headstock, and thin enough to clear the back of the faceplate. This plate was put in position and the faceplate put in place. The wheel E was then put on the wood blocks F, which were far enough from the outside edge of the wheel to allow a pointer to pass around the outside groove as a means of properly adjusting the wheel. The gears on the end of the lathe, being in the way, were removed. The iron blocks G G were used for spaces between the hub of the wheel and the headstock. Straps were placed across the spokes, and bolts run between the straps and the plate D through properly placed holes in the straps and plate, as shown, the bolts being then tightened enough to hold the wheel in position.

The boring bar A was run through the headstock and the hub, the pointer H was put in the slot in the bar, and the wood clamps J, which were a tight fit on the bar, were tightened on it against the faceplate. A lathe dog, K, was put on the end of the boring bar, and a bar, L, was driven into one of the faceplate slots, to strike against the dog and turn the boring bar when the lathe head was rotated. The tailstock center was then run up against the center in the back end of the boring bar, and the arrangement was ready for boring out the wheel.

The pointer H was rotated around the wheel and the wheel adjusted, then the pointer was removed and the cutter substituted. The job required considerable work, but the boring was as good as if it had been done in a boring mill.—Contributed by Jas. W. Shelton, Clifford, Ill.

¶A piece of stiff paper or emery cloth, placed between a small piece of metal and the drill-press table, will prevent the metal from turning while being drilled.

¶White lead may be tinted to a sage green by the addition of light chrome green, 4 parts, and ivory black, 1 part, until the desired color is obtained.



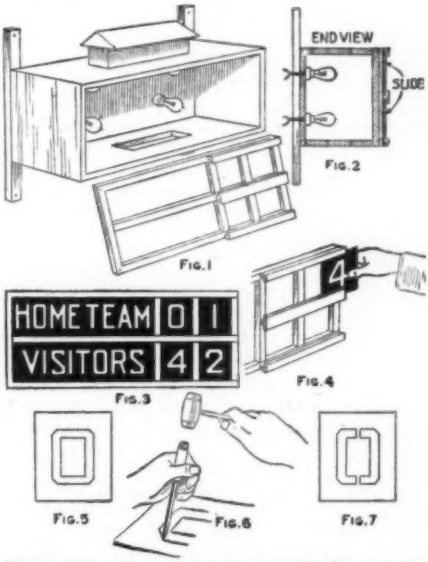
Electric Score Board for Indoor Games

A very satisfactory electric score board, for use in scoring basketball and other games played indoors, is shown in the illustration. It is constructed entirely of wood, but should be lined with asbestos board or sheathing. The dimensions are a matter of choice, but one 4 ft. long, 2 ft. wide and 18 in. deep is a good size. The back of the box is provided with two cleats, each 2½ ft. long, fastened at each end. This allows a projection of 3 in. at the top and bottom, for fastening the score board to the wall. The manner of construction is shown in Fig. 1, and a cross section of the box, in Fig. 2.

The front of the box should be fastened with screws so as to make its removal easy in case of repairs. This part of the box carries the frame for inserting the numbers and the words "Home Team" and "Visitors," as shown in Fig. 3. As the words are a permanent fixture, the cards carrying them are fastened to the front. At the end of these words a frame is constructed as shown in Fig. 4, in which the cards having the numbers are inserted in slides.

Numerals and letters can be cut out of heavy cardboard or tin. The design of a letter having sharp angles and straight edges, as shown in Fig. 5, is very easily cut out with a chisel. The method of cutting is shown in Fig. 6.

As portions of the letters and numerals, such as the center in an O, would fall out if cut entirely around, some way must be provided to hold the parts in place. The way to prepare stencils is to leave a portion uncut, which is known as a tie, and the letter will appear as shown in Fig. 7.



Electric Indoor Score Board, Showing Its Construction and Manner of Cutting Out the Letters and Numbers

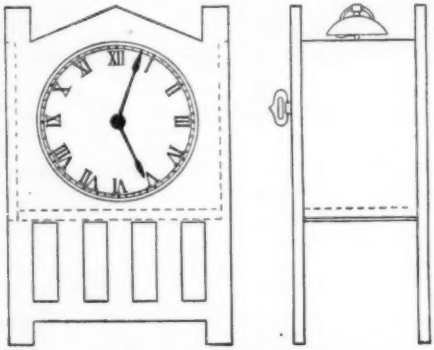
The best method for making these letters and figures is to cut out the letter entirely, then to paste thin paper over the back and replace the parts removed by the cutting in their original position.—Contributed by James M. Kane, Doylestown, Pa.

A Mission Frame for an Alarm Clock

The old nickelplated alarm clock which usually adorns the kitchen mantel is, to say the least, not ornamental, and I improved the appearance of mine

without lessening its usefulness by making a small case in mission style for it.

The sketch shows a design which is neat and easily made. Accurate di-



An Alarm Clock with a Wood Covering Ornamented and Finished in Mission Style

mensions cannot be given as these will vary with the size of the clock. Quarter-sawed oak, ¼ in. thick, is the best material to use. The front and back can be cut on a jigsaw, the opening for the clock face being cut slightly smaller than the metal of the clock so that only the face shows. An opening in the back piece should be cut a little smaller than the one in front, to provide a free opening for winding the clock. Fasten the parts together with small round-head brass brads or screws and finish to match the furniture. A small desk clock can be made in a similar manner, using a cheap watch instead of the alarm clock.—Contributed by C. E. Hamann, Somerville, Mass.

Mixing Sulphuric Acid

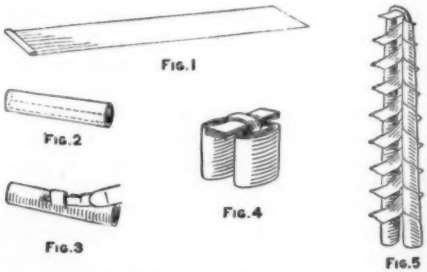
One of the first lessons given a student in chemistry is how to mix sulphuric acid with water. This would naturally be supposed to be very easy, yet, if it is not done right, it will surely result in injury to the person doing the mixing.

The specific gravity of sulphuric acid is 1.849 and, on account of its chemical attraction to water, great heat is set up or generated when the two are being mixed. If the acid is put into a jar and the water poured onto it, they will be temporarily separated, as the heavy acid will remain at the bottom, the chemical reaction taking place on the dividing line only. This soon generates heat which rapidly increases until steam is formed. Then the water boils over and finally becomes a bubbling volcano which readily ejects the contents of the jar. As the mixture at this moment is very hot, bad burns will be the result, which are aggravated by the biting of the acid; and clothing or anything that it comes in contact with will be ruined or badly damaged. Always remember this caution: add the acid to the water.

The following is the proper way to proceed in mixing sulphuric acid as well as other acids of lighter weight. Place the water in a jar and pour the acid in, a little at a time, stirring the mixture with a wooden stick. The mixing process will always heat the solution, which in many instances, must be allowed to cool before using.

A Chinese Pagoda

Fold the end of a long and narrow strip of paper over several times as shown in Fig. 1 and roll the entire length over a stick, then remove the roll and crease, or make it flat, as



Stages in Making the Strip of Paper into the Finished Pagoda

shown in Fig. 2. Make two cuts with a sharp knife centrally so that they reach to the several folds first made

on the inner end of the paper, then cut the fold in the paper between the cuts as shown in Fig. 3, and bend the ends over to form the shape in Fig. 4. Insert the knife blade under the first fold and draw it out until the paper takes the form in Fig. 5.

These pagodas can be made large or small, as desired, and also varied in several ways. Large ones can be formed and used as small tree ornaments. All that is necessary to make them high is to roll up one strip of paper on another in the rolling process.

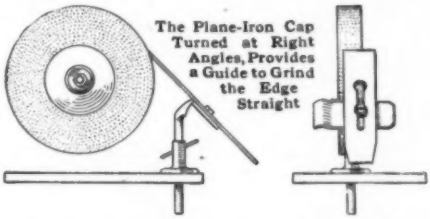
In rolling up several strips, one on top of the other successively, various colored papers may be used and the appearance is greatly enhanced.—Contributed by Chas. C. Bradley, W. Toledo, O.

A Cuspidor Carrier

The task of handling cuspidors under all conditions is anything but pleasant, but the carrier shown in the sketch makes quite an improvement over ordinary methods. The carrier consists of an iron rod, ¼ in. in diameter and 3 ft. long. One end is bent to fit around the neck of the cuspidor and the other is shaped into a handle.

Guide for Grinding a Plane Iron

When a plane iron has been sharpened a number of times, it often becomes so out of square that the edge cannot be made parallel with the bottom of the plane block, even by using the lateral adjustment. Where this happens, the plane iron must be reground. If an emery wheel mounted in a polishing head or lathe is at hand, this can be easily accomplished. Loosen the plane-iron cap and screw it down at right angles to the plane iron, also reverse the tool rest as shown in the sketch. In this way the work can be done better and more



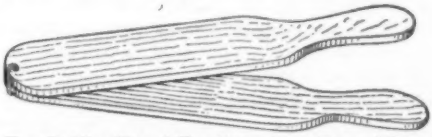
quickly than by the usual method.—Contributed by L. S. Uphoff, Schenectady, N. Y.

To Prevent Torch Lights from Smoking

In the shop or factory oil torches are sometimes used and much trouble is experienced by the excessive smoking of the flame. This occurs because too much carbon remains unburned, and can be remedied by first soaking the wick in a weak solution of acetic acid. A 5-per-cent solution can be purchased for a few cents at any drug store and will soak a great number of wicks. The acid is not poisonous unless taken internally.

A Lard and Fruit Presser

A very simple but handy device for pressing out lard, juices for jelly, or fruit for marmalade, is made from two boards, each 18 in. long, 3 in. wide and ½ in. thick, formed into the shape of paddles and hinged together. The hinge is made by running a wire through holes bored in one end of the paddles and twisting the ends together

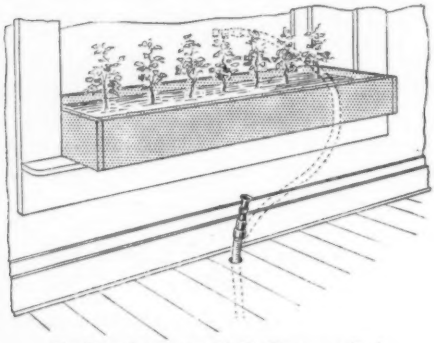


Two Paddles Hinged Together with a Piece of Wire Make a Presser for Lard and Fruits

as shown. This presser will save the hands from stains and other effects of the juices.—Contributed by Julia A. White, Glenburg, Pa.

Hose Attachment for Watering Window Plants

The window garden of the house has its watering difficulties which one owner overcame in a neat and handy



The Hose is Automatically Run on a Reel by a Weight beneath the Floor

manner. A hose on a weighted reel was attached to the joists in the basement under the floor near the window flower pots. The weight on the reel kept the hose wound on it and the nozzle end which projects through the floor is large enough to hold it from passing through the hole bored for the hose. A long stem valve was provided with the wheel attached above the floor for turning the water on and off.

When the plants need a shower all that is necessary is to draw the hose nozzle up and turn on the water. The hole for the hose and the valve wheel can be located close to the wall under the flower tray where they will scarcely be seen.

Removing Paint from Glass

Paint may be easily cleaned from glass by using a 50-per-cent solution of acetic acid. The acid should be heated and applied with a cloth. The hot acid will not hurt the hands or fabrics, nor the glass, but should be kept from children who might drink of it. The solution is made of commercial acetic acid and heated by adding hot water. The acid is inexpensive and can be purchased at any local drug store.

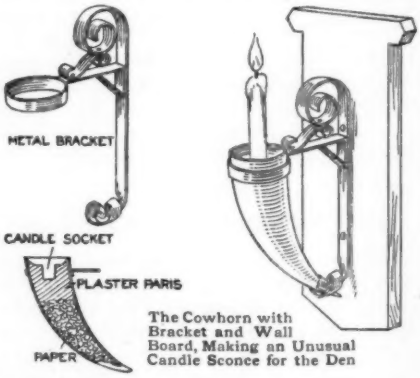
To Prevent Baking Ovens from Scorching

A good method to prevent baking ovens from scorching or burning pastry is to sprinkle a mixture of sand and salt on the bottom where the pans are placed. This affords a way of radiating the heat evenly. The mixture also absorbs fruit juices, which may be spilled in the course of cooking. The covering is easily changed, which keeps the oven clean. The best proportion is half salt and half sand.

Horn Candle Sconce

The person who cares for things unusual will find the candle sconce made of a cowhorn a suitable fixture for the den. A well shaped and not too large cowhorn is selected, and prepared by first partly filling it with paper, packed in tightly, then filling it to the top with plaster of Paris, in which a candle socket is formed.

The bracket is made of strips of metal, formed as shown and riveted together where they touch each other, the back piece being fastened with screws to a wall board. The metal may be brass or copper and finished in



The Cowhorn with Bracket and Wall Board, Making an Unusual Candle Sconce for the Den

nickel, antique, bronze, or given a brush finish. The wooden wall piece can be finished in any style desired.

¶ White spots on furniture can be removed by rubbing the wood with ammonia.

How to Construct a Simple Galvanometer

A galvanometer is an instrument used to detect the presence of an electrical current in a circuit or to measure the value of the current in amperes. The operation of practically all galvanometers is based upon the same principle, and they differ chiefly in mechanical construction and the relative arrangement of their different parts.

A very simple galvanometer, that will give quite satisfactory results, under favorable conditions, may be constructed as follows: Turn from a piece of hard wood a ring having dimensions corresponding to those given in the cross section, Fig. 1. Fill the groove in this ring to within 1/8 in. of the top with No. 18 gauge double-cotton-covered copper wire, insulating the different layers from each other by means of a layer of good bond paper. The winding may be started by drilling a small hole through the side of the groove, as close to the bottom as possible, and allowing about 6 in. of the wire to protrude through it. The outside end may be terminated in a similar manner, and the two ends should be on the same side of the ring, or as near each other as possible. A protecting covering of bookbinder's paper is placed over the winding and the completed ring given a coat of shellac. The electric current to be detected or measured is to pass around the winding of this coil and produce an effect upon a compass needle mounted in its center. In order that the current may produce a maximum effect upon the needle, the coil should be mounted in a vertical position.

The base upon which the ring is to be mounted may be cut from some 1/2-in. hard wood. It should be circular in form and about 5 in. in diameter, and have its upper edge rounded off and shellacked to improve its appearance. The ring is mounted in a vertical position on this base, which may be done as follows: Cut a flat surface on each of the flanges of the ring so that it will stand in a vertical position and the terminals of the winding will be as near as possible to the

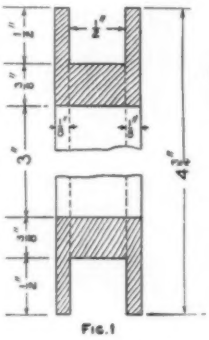


Fig. 1

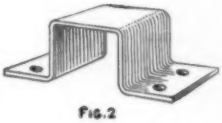


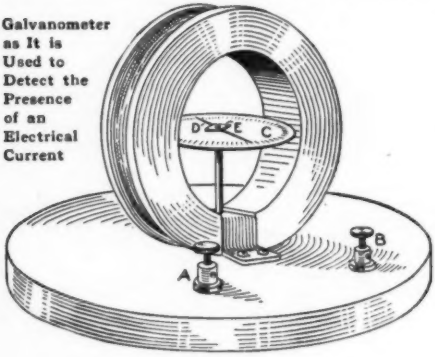
Fig. 2

The Wood Ring for the Coil and Its Holding Stirrup

surface upon which the ring rests. Then form a stirrup from some thin sheet brass, similar to that shown in Fig. 2, so that it will fit tightly over the ring and its outwardly projecting ends will rest upon the base of the instrument. Small wood screws are used in fastening the stirrup to the base. The fastening may be made more secure by cutting a groove across the inside of the ring for the stirrup to fit in, Fig. 3, thus preventing the possibility of the ring moving through the stirrup. Two holes should be drilled in the base for the terminals of the winding to pass through, and it would be best to cut two grooves in the side of the ring for these wires so as to prevent their coming into contact with the metal stirrup. Two back-connected binding posts, A and B, Fig. 3, are mounted on the base and the ends of the winding attached to them. The wires should be placed in grooves cut in the under side of the base, and the screws used in fastening the binding posts should be countersunk.

A short compass needle is then mounted on a suitable supporting pivot in the center of the coil. This compass needle will always come to rest in an approximate north and south position when it is acted upon by the earth's magnetic field alone. If now the plane of the coil be placed in such a position that it is parallel to the di-

rection of the compass needle (no current in the coil), the magnetic field that will be produced when a current is sent through the winding will be perpendic-



Galvanometer as It is Used to Detect the Presence of an Electrical Current

Fig. 3

ular to the magnetic field of the earth and there will be a force, due to this particular current, tending to turn the compass needle around perpendicularly to its original position. There will be a deflection of the needle for all values of current in the coil, and this deflection will vary in value as the current in the coil varies. The mere fact that the compass needle is deflected due to a current in the coil gives a means of detecting a current in any circuit of which the coil is a part, and the degree of this deflection affords a means of measuring the current, the value of the different deflections in terms of the current in the coil having been experimentally determined by sending a known current through the coil and noting the positions of the compass needle for each value of current used.

In order to determine the deflection of the needle, a scale, C, Fig. 3, must be mounted directly under the compass needle and a pointer, D, attached to the compass needle so that any movement of the needle results in an equal angular displacement of the pointer. The compass needle, E, should be short and quite heavy, say, ⅝ in. in length, $\frac{1}{16}$ in. in thickness and ¼ in. in width at its center, and tapering to a point at its ends. It should be made of a good grade of steel, tempered and then magnetized by means of a powerful electromagnet. The reason for making the compass needle short is that it will then operate in practically a uniform magnetic field, which exists only at the center of the coil. On account of the needle being so short and in view of the fact that it comes to rest parallel to the coil for its zero position, it is best to use a pointer attached to the needle to determine its deflection, as this pointer can be made much longer than the needle, and any movement of the needle may be more easily detected, as the end of the pointer moves through a much larger distance than the end of the needle, and since it may be attached to the needle, at right angles to the needle's axis, the end of the pointer will be off to one side of the coil and its movement may be easily observed. The pointer should be made of some nonmagnetic material, such as aluminum or brass, and it should be as long as it may be conveniently made. A suitable box with a glass cover may be provided in which the needle, pointer and scale may be housed. The construction of this box will be left entirely to the ingenuity of the one making the instrument.

In order to use this instrument as an ammeter, it will be necessary to calibrate it, which consists in determining the position of the pointer for various values of current through the

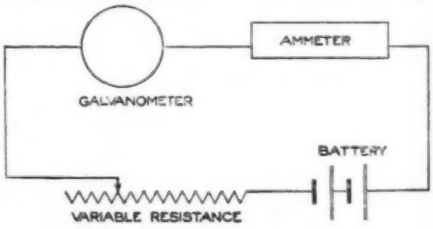


Fig. 4
The Electric Circuit, Showing Connections for Finding the Value of a Current in Calibrating

coil. It will be necessary to obtain the use of a direct-current ammeter for this purpose. The winding of the galvanometer, ammeter, battery and a variable resistance of some kind should

all be connected in series as shown in the diagram, Fig. 4. Allow the compass needle to come to rest under the influence of the earth's magnetic field and then turn the coil into such a position that it is as nearly parallel with the needle as possible. This corresponds to the zero position, and the instrument must always be in this position when it is used. The position of the ends of the pointer is now marked on the scale for different values of current, first with the current in one direction and then in the opposite direction. The deflection of the needle will, of course, reverse when the current is reversed.

The effect produced by any current upon the compass needle can be changed by changing the number of turns in the coil. In measuring a large current, a few turns of large wire would be required, and in measuring a small current, a large number of turns of small wire could be used. In other words, the size of the wire will depend upon the current it is to carry and the number of turns in the coil will depend upon the magnetic effect the current is to produce, which is proportional to the product of the number of turns and the current, called the ampere-turns.

Experiments with Camphor

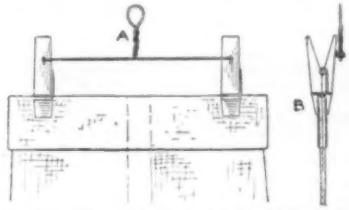
Place a few scrapings from gum camphor in a tumbler of water and watch the phenomenon. The scrapings will go through all kinds of rapid motions as if they were alive. A drop of turpentine, or any oil, will stop their maneuvers. This experiment will show how quickly oil spreads over the surface of water.

Boiling Cracked Eggs

Eggs with the shells cracked can be boiled in the ordinary manner without danger of the white boiling out, if they are first wrapped in tissue paper. As soon as the paper becomes wet it will cling so tightly to the shell that the cracks are effectively closed.

A Trousers Hanger

A very serviceable hanger can be easily made of two clothespins of the clip type and about 2 ft. of large wire.

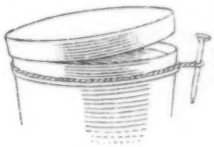


Clothesline Clips Joined Together with a Wire and Used as a Trousers Hanger

The wire should be bent into the shape shown at A with a loop about 1 in. in diameter as a hanger. The ends of the wire are slipped under the hooks on the sides of the clothespins, which are fastened to the trousers as shown in B.—Contributed by Olaf Tronnes, Evanston, Ill.

Removing Tight-Fitting Can Covers

Tight-fitting covers on lard and similar pails can be readily removed by tying a stout cord loosely below the cover, then placing an ordinary nail under the cord and twisting it. This will tighten the cord around the can evenly, which will loosen the cover.



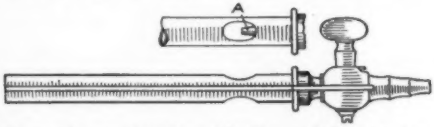
A Skimming Spoon

A handy skimming spoon can be made very quickly of an ordinary spoon of any size desired. Slits are sawn across the bowl in the manner shown, using a hacksaw. The illustration is self-explanatory.—Contributed by G. H. Holter, Jasper, Minn.

The Straight Cuts Sawn Across the Bottom of the Bowl Provide Openings to Drain Out the Liquid

Homemade Bunsen Burner

The amateur craftsman, at some time or other, needs a hot flame for certain kinds of work, and a Bunsen or



Bunsen-Burner Attachment for Use with Illuminating Gas Taken from the House Mains

alcohol flame is brought into service. The gasoline and alcohol flames have their drawbacks, one of which is the starting of the burner and the waiting for the heat. They are also unhandy in directing the flame on parts of the work. As I desired a burner for quick work and one whose flame I could direct at any angle, for repoussé and chasing on copper and silversmith's work, I made the one shown in the sketch to attach to a hose and connected it with the gas pipe of the illuminating system in the house. It consists of a hose connection into which a piece of pipe, 5 in. long, is fitted. The hose connection is also fitted with a small nozzle, A, for the gas, and the pipe has an opening through it at the end of the nozzle.—Contributed by John Koestner, Brooklyn, N. Y.

Cane-Seat Cleaner

A rapid and practical method of removing stains and discolorations from the cane seats of chairs, wickerwork, etc., is to use oxalic acid and powdered pumice.

Dissolve oxalic-acid crystals in hot water and saturate a small stiff brush in it, then dip the brush in the powdered pumice and rub the discolored cane briskly with the brush.—Contributed by W. F. Jaquythe, Richmond, California.

Shade-Roller and Curtain-Pole Bracket

The main advantage of this shade bracket is that a person can lower it for adjusting the shade or in changing curtains while standing on the floor, thus eliminating the use of a step ladder and the danger possibly attending such use.

The front elevation of a window with bracket attachment in position is shown in Fig. 1, and a cross section in Fig. 2. The position of the curtain pole when the brackets are lowered is shown by the dotted lines. A detail sketch of the support end is given in Fig. 3 and one bracket is shown in Fig. 4.

The curtain pole A is fastened to the brackets B with 1/4-in. dowel pins, C.

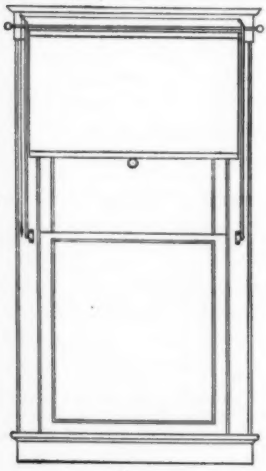


Fig. 1

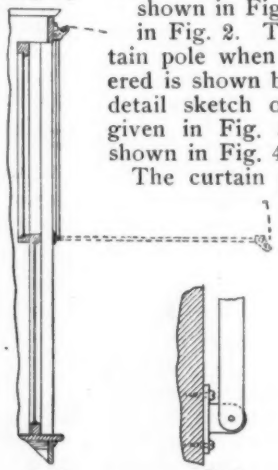


Fig. 2

The Brackets as They are Attached to a Window Casing for Lowering the Curtain Pole

Fig. 3

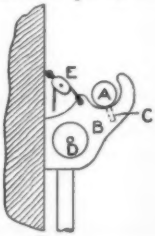


Fig. 4

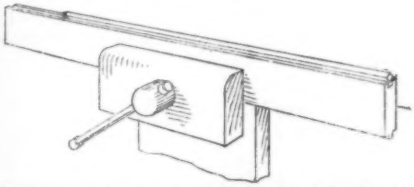
The Attachments, Supports and Brackets for Holding both Curtain Pole and Shade Roller

These pins and the pole keep the brackets from spreading at the top, so that a shade roller, D, may have its attachments fastened to the inner sides of the brackets. A small pulley, E, is attached to the window casing above the right bracket and a double pulley is located above the left, cords being passed through them, down along the casing to a point within easy reach, and fastened in any manner desired.

All that is necessary to change the curtains or fix a shade is to loosen the cord and allow the brackets to drop down until they may be easily reached. —Contributed by James F. Napier, Montreal, Can.

Planing Arrow Sticks

While making some bows one day I discovered I had no suitable dowel sticks for the arrows, so I started to make them out of 1/4-in. square stock. I found it rather difficult to plane these pieces until I hit upon the scheme



Planing the Corners from Square Stock by Placing Them in the Groove of a Flooring Board

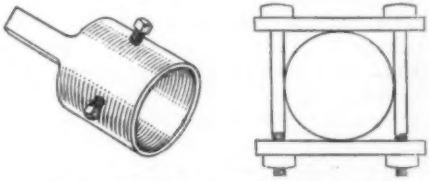
shown in the sketch. I procured a piece of ordinary tongue-and-groove flooring and clamped it in the bench vise, then drove a nail in the groove to act as a stop, and in no time I had the sticks planed into arrows.—Contributed by J. F. Culverwell, Washington, District of Columbia.

To Clean Shellac from a Brush

Put the brush in a strong, warm solution of borax and water, and then wash in clean, warm water. If the bristles have become hard, allow the brush to remain in the solution until soft, keeping the solution warm in the meantime; then wash it out in warm water.—Contributed by N. J. Shattuck, Woburn, Mass.

Lathe Dogs

In the absence of a full equipment of lathe dogs the amateur can make them cheaply from pieces of iron pipe.



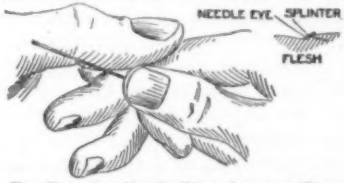
Two Forms of Lathe Dogs That are Quickly and Cheaply Constructed

One of these is shown in the sketch. A section of pipe, 1½ in. to 3 in. long, is partly cut away, as shown, leaving a projection of metal 1 in. wide. One or more setscrews are fitted in the round part, and the dog is complete.

A dog, or driver, may also be made of two U-clamps and two bolts as shown. This is especially useful for large work, where the cost of a dog would be prohibitive. After these two clamps are bolted on the work to be turned a bolt is attached in the faceplate that bears against the clamp, thus turning the work.

To Remove a Splinter from the Flesh

Quite frequently small particles of steel, splinters, or thorns are run into the flesh and cannot be removed with the fingers. These can be readily removed in the following manner: Press the eye of an ordinary needle over the protruding end, then turn the needle



The Eye of a Needle Slipped over a Thorn for Removing It from the Flesh

until the edges bind or clinch. While in this position, raise the needle and out comes the splinter.

¶A fine luster can be given to zinc by rubbing it with kerosene or a weak solution of sulphuric acid.

Cleaning Steel of Grease and Stains

Grease and stains can be easily removed from steel with a mixture of unslaked lime and chalk powder, by rubbing it on the steel with a dry cloth. The best proportion for the mixture, which is easily prepared, is 1 part of lime to 1 part of chalk powder. The powder should be used dry. It is kept in cans for future use and can be used over and over again.—Contributed by Loren Ward, Des Moines, Iowa.

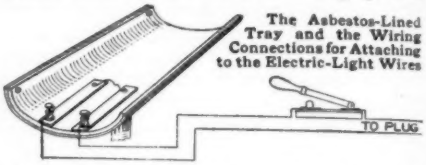
An Electrically Ignited Flash Light for Making Photographs

The results obtained in a great many cases in trying to take pictures by flashlight are exceedingly unsatisfactory, as the expression on the faces of the people in the picture usually is strained or unnatural, due to the suspense in waiting for the flash. The following simple device avoids this difficulty because the flash is set off by means of electricity, so that the operator can control the flash from a distant point and thus be able to take the picture quite unawares to his subjects.

The construction of the device is as follows: Obtain a piece of rather heavy sheet iron, about 6 in. wide and 10 in. long. Bend this piece of iron into the form shown in the sketch, and fasten a wooden handle to it with a wood screw. Obtain a sheet of ⅛-in. sheet asbestos, the same size as the piece of sheet iron, and glue it to the inside surface of the curved piece of iron. It is best to fasten the four corners down by means of some small rivets with rather large washers under the heads next to the asbestos.

Now mount two pieces of sheet copper, ½ in. wide and 6 in. long, parallel with each other on the surface of the asbestos and 1½ in. apart, so that their ends are even with the end of the piece of asbestos. These pieces of copper should be insulated from the piece of sheet iron, and there should be a small screw in one end of each and a small binding post mounted on the other end.

Procure a piece of lamp cord, 15 or 20 ft. in length. Fasten an ordinary plug to one end of this cord and the other end to the two binding posts.



Open one of the conductors in the cord at some point and introduce a single-pole switch, as shown in the sketch. Close the gap between the two pieces of copper by means of a piece of No. 32 gauge copper wire. Place the flashlight powder in position, but do not cover up the wire or have it in actual contact with the powder, and close the circuit. The operator may include himself in the picture by having a sufficiently long piece of lamp cord and the switch properly arranged.

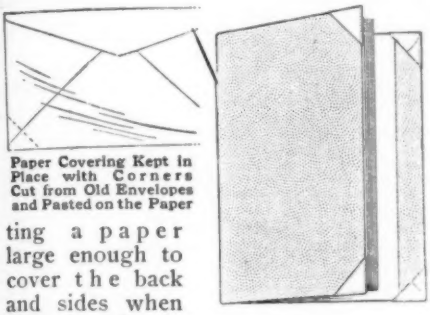
A Simple Twine-Ball Holder

In looking for a place to put a twine ball I happened to see a tin funnel and it gave me the idea which I put into practice. I punched three holes at equal distances apart in its upper edge and attached three strings which were run to an apex and tied to a screw-eye in the ceiling. The end of the twine from the center of the ball was run through the funnel stem and allowed to hang as in an ordinary ball holder.—Contributed by W. C. Loy, Rochester, Ind.

¶A filler for birch, red gum and beech can be made of 1 lb. of bleached shellac to each gallon of water.

A Book Covering

New books can be quickly and neatly covered to keep them clean by cutting a paper large enough to cover the back and sides when the book is closed, allowing 1 in. extra at each end to be turned over the front and back edges, then pasting on corners cut from used envelopes. The paper jacket can be slipped on or off easily when the book is opened, and it will keep a new cover clean while the book is being handled.—Contributed by Dr. John A. Cohalan, Philadelphia.



Paper Covering Kept in Place with Corners Cut from Old Envelopes and Pasted on the Paper

A Tilting Inkstand

An ink-bottle stand, that can be tilted or adjusted so that the pen will always be filled with a sufficient quantity of ink even when little of it remains in the bottle, as shown in the sketch, can be easily made by the amateur. The base may consist of a square piece of sheet brass, which has soldered or riveted to its center two pieces of spring brass, placed crosswise and bent upward so as to form clips to hold the bottle firmly. The legs are made of two lengths of wire, of sufficient stiffness, and are shaped to form holders for lead pencils and penholders. One pair of the legs may be soldered to the brass plate and the opposite side of the latter rolled over the other pair so as to allow them either to stand upright or be depressed in order to tilt the stand, when the ink supply in the bottle gets low.

Tilting Stand for an Ordinary Ink Bottle to Give Access for a Small Supply of Ink

A Ring Trick

The trick to be described is one of the simplest and at the same time one of the most effective, and but little "make-ready" is required to perform it. The magician, while sitting in a chair, allows his hands to be tied together behind the back of the chair. A ring is placed between his lips which he claims to be able to slip on his finger without untying his hands. This, to the audience, seems practically impossible, but it is easily accomplished.

A screen is placed in front of the performer before the trick is started, so that the audience will not see how it is done. As soon as he is hidden from view, he tilts his head forward and drops the ring in his lap. He then allows the ring to drop to the seat of the chair between his legs. The chair is tilted backward slightly, and he raises himself to allow the ring to slip to the back part of the chair seat, where he catches it in his hands and slips it on the finger. Any one finger may be mentioned, as he can slip the ring as readily on one as on another. Use a leather-bottom chair, if possible, as the least noise will then be made when the ring is dropped.—Contributed by Abner B. Shaw, N. Dartmouth, Massachusetts.

Removing Old Putty

A very effective way to remove old putty from window panes or other articles is to apply a red-hot iron, as follows: The iron should be made of a broken file or cold chisel and the point heated quite hot. This is run over the surface of the putty, which will crack and fall off. Be careful not to let the hot iron touch the glass, as the heat may cause the latter to break.

PATENTS, PRACTICAL OR UNIQUE

Fig. 1

SELF-OPENING AND CLOSING INKSTAND (Fig. 1; German patent)—The placing of the penholder on the hooklike support closes the top of the ink receptacle, and the removal of the penholder allows it to fly open.

NEW TYPE OF DUSTER (Fig. 2)—The two articles most commonly used for dusting purposes are the feather duster and the dusting cloth. Here is a combination of the two, the clothes being arranged on a handle in imitation of the feather duster.

Fig. 2

NON-SLIP TROLLEY WHEEL (Fig. 3)—The trolley wheel here shown is designed in such manner that the wire will find difficulty in escaping from it. It comprises three wheels, the purpose of the outer wheels being to replace the trolley wire on the center wheel should it slip off.

ATTACHING THE HYDROPLANE TO THE AEROPLANE (Fig. 4)—This drawing shows a means of attaching the hydroplane or boat portion to the flying portion of the hydro-aeroplane. The object of this method of attachment is to prevent jar when rising from and alighting upon the water.

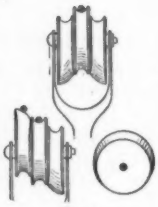


Fig. 3

COMBINED HAIRBRUSH AND COMB CASE (Fig. 5)—Here is a hairbrush back that likewise serves as a case for the comb, the latter being slipped into it through an opening in the end.

DEVICE TO PREVENT DOGS FROM WORRYING SHEEP (Fig. 6)—In this device, which is designed to prevent dogs from worrying sheep, not much consideration is given the poor dog. The nose hook is the kind of grapple used in fishing, and is an instrument which the humane societies would not allow anyone to use without strenuous protest.

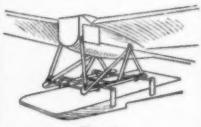


Fig. 4

A "HANG ONTO YOUR HAT" DEVICE (Fig. 7)—Champagne corks have to be wired into the heads of the bottles to keep them from popping out, but it would hardly seem necessary to secure a hat in place by this somewhat similar method, even though the idea has been patented. A pair of standards, formed by twisting two wires together, are attached to the hat and to the shoulders of the wearer.

Fig. 5

TRACTION ELEVATOR (Fig. 8)—The inventor of this method of elevator operation has assigned it to one of the big elevator-manufacturing companies. The drawing clearly shows the operation.

EXHAUST OUTLET FOR MOTORBOATS (Fig. 9; French patent)—A French inventor has constructed a hollow perforated rudder-post into which the exhaust from the motorboat is allowed to discharge. He claims that the outrush of gases through the holes will cause a suction which will add to the propulsion power of the propeller.

Fig. 6

STAGE AUTOMOBILE CONSTRUCTED TO BLOW UP (Fig. 10; British patent)—The desirability of imitating automobile explosions on the stage has resulted in this type of bonnet construction for stage automobiles. The bonnet is built up of staves like a barrel, back of which are set powerful springs. When a wedge is pulled out the ends of the barrel are released and the staves are shot in all directions by the springs at the same time.

TRAP SET BY ONE MOUSE FOR THE NEXT (Fig. 11)—Every mouse entering this trap sets it for another to follow. When the mouse enters the trap, the door drops, and, as escape is cut off in this direction, the rodent runs out upon the balanced chute and is dropped into the water by its own weight. The movement of the chute raises the door and sets it for the next mouse.

TWIN-MASTER SAILING VESSEL (Fig. 12)—An unusual arrangement of the masts of a sailing vessel is here shown. The four masts are set in pairs.

Fig. 7

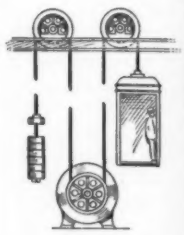


Fig. 8

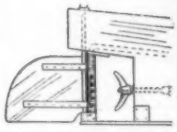


Fig. 9

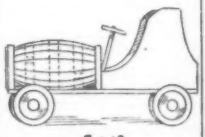


Fig. 10

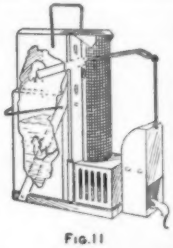


Fig. 11

Fig. 12

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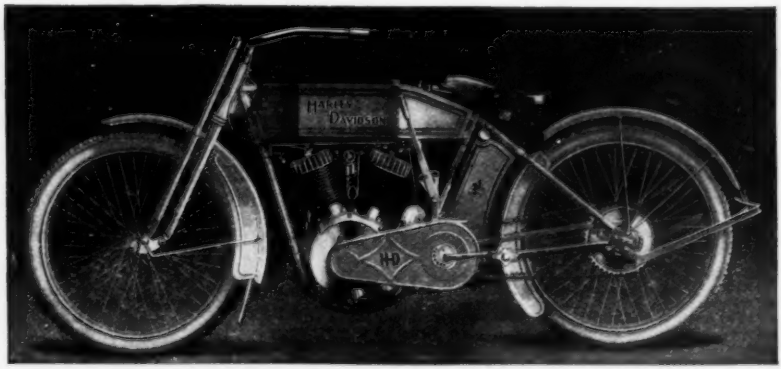
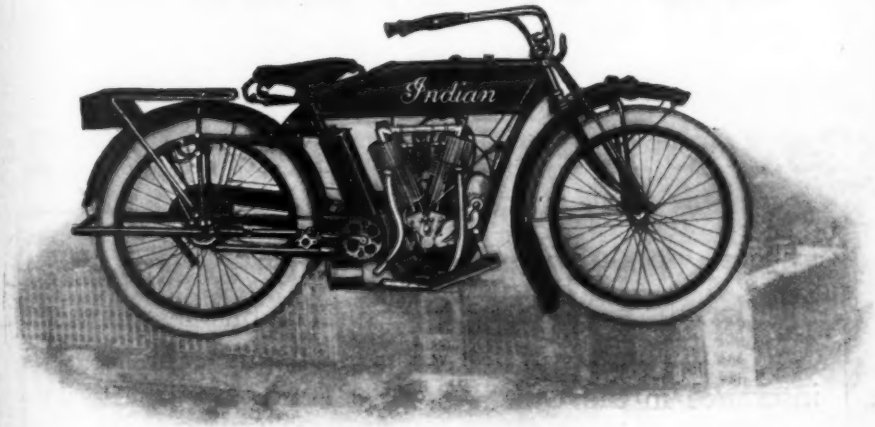


The Producing Power back of The Indian Motocycle



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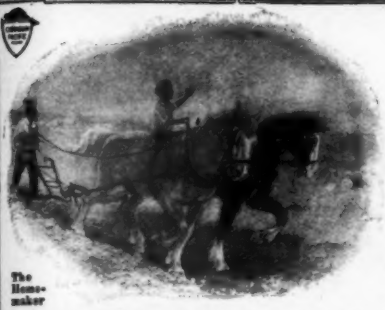

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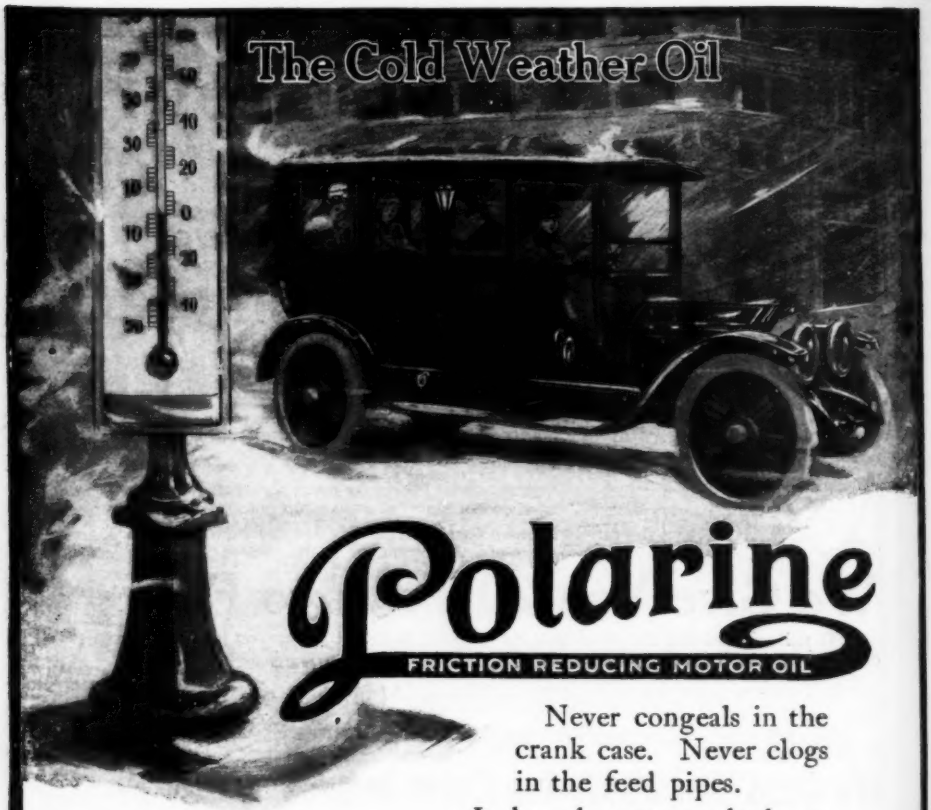

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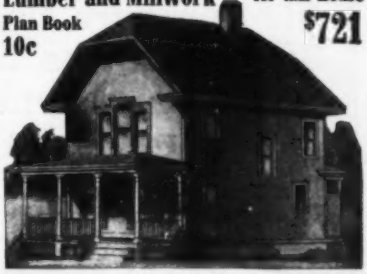

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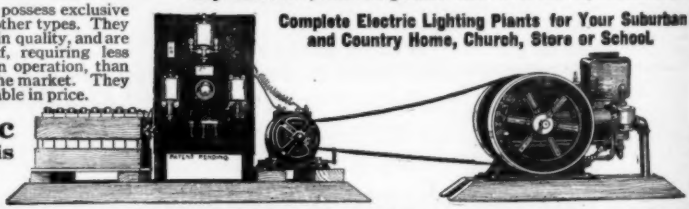

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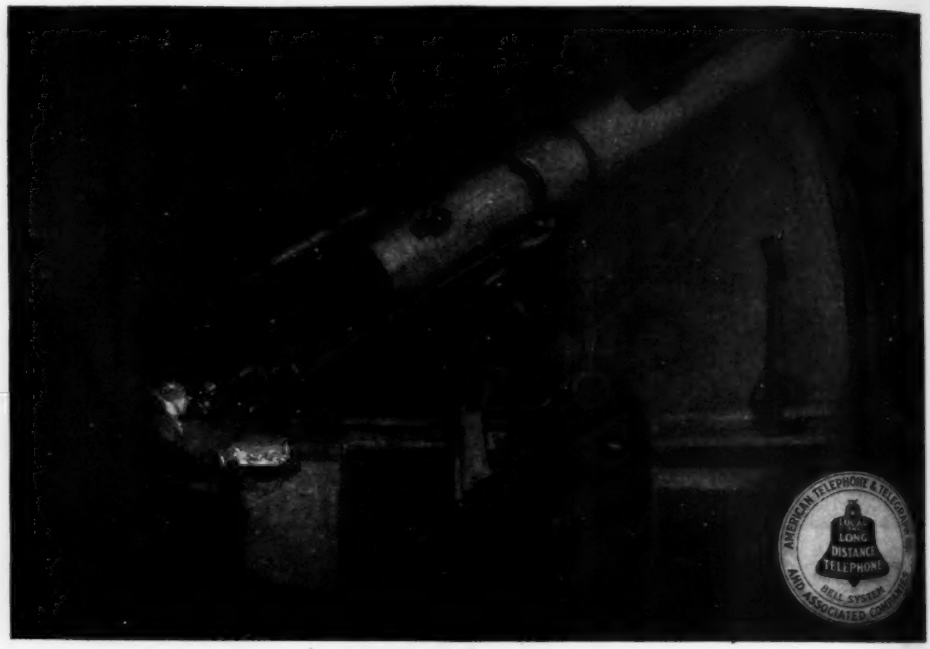

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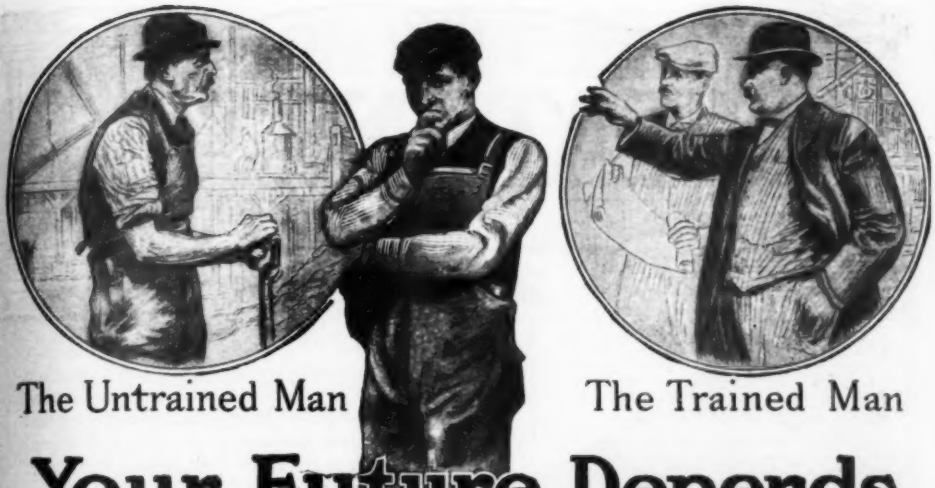

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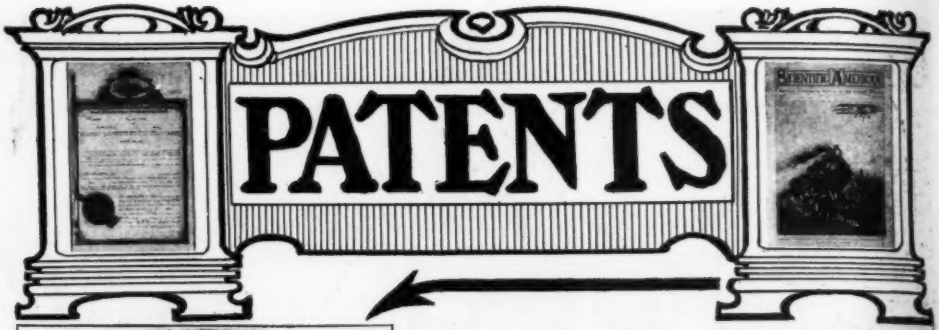

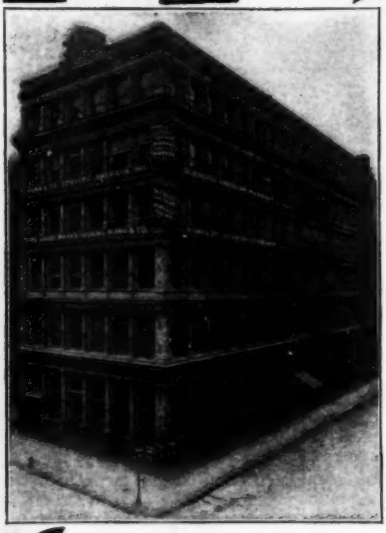

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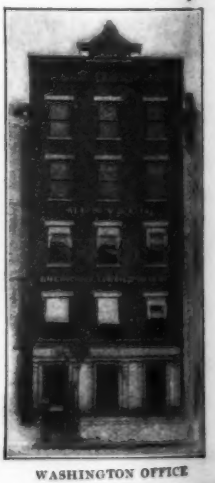

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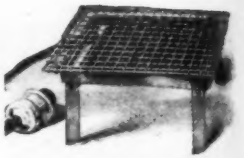

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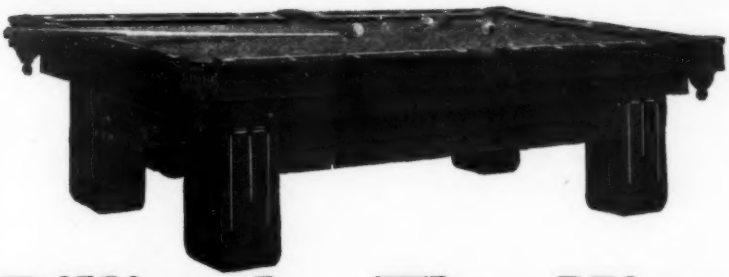

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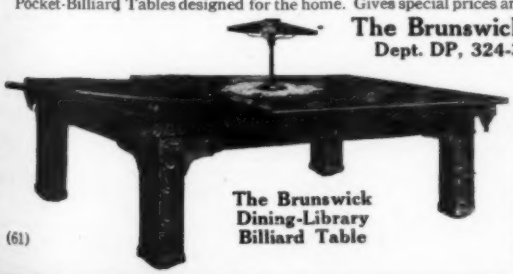

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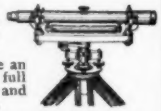

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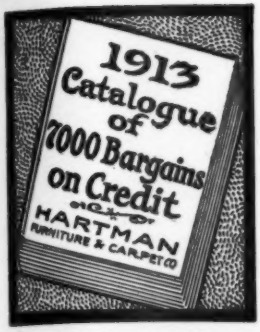

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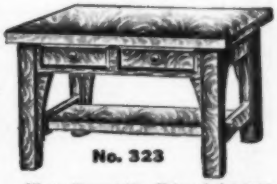

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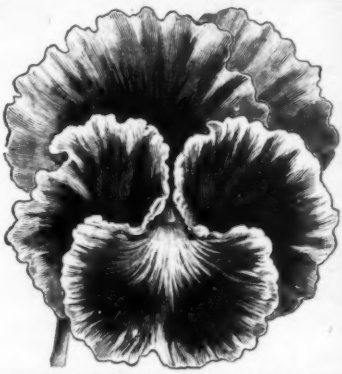

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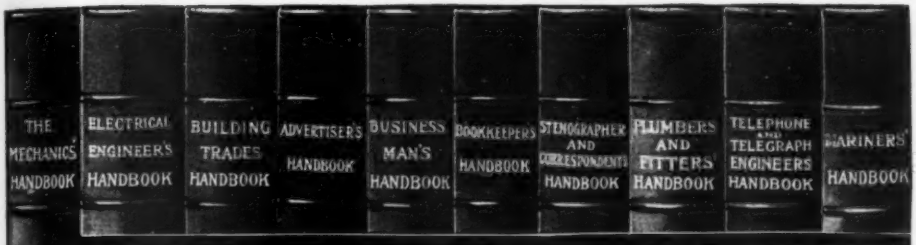

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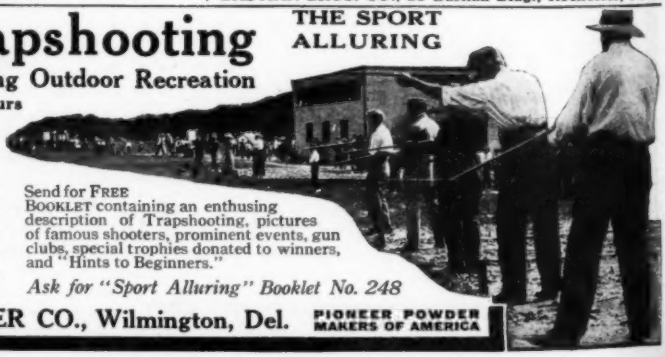

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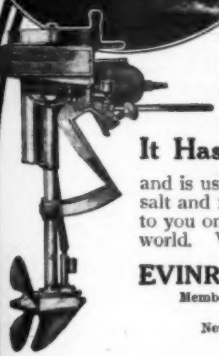

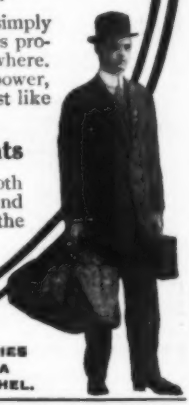

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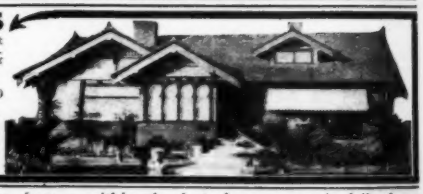

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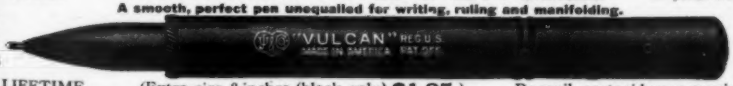

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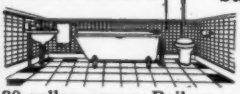

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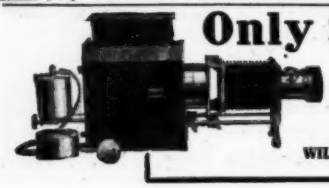

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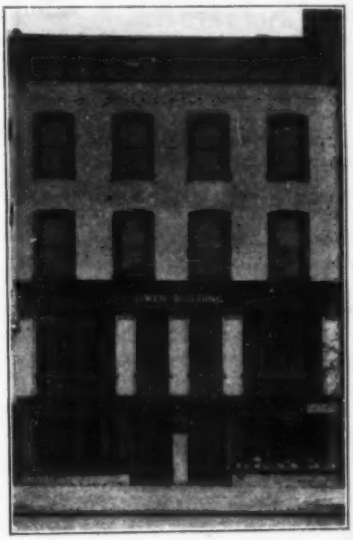

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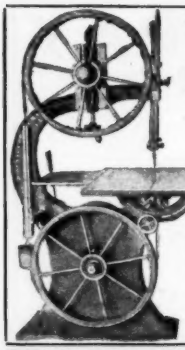

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Please send me free booklet describing the Sebastian Garage Lathe.

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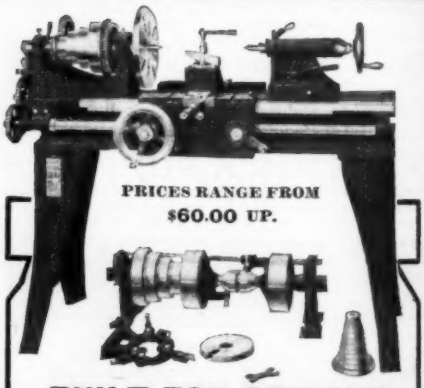

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is giving such absolute satisfaction that you could not help but be pleased with it if you want a substantial, durable, convenient combination wood worker. Get our catalog telling all about it, and describing our line of band saws, saw tables, shapers, jointers, borers, planers and matchers, disk grinders, variety wood workers, band saw blades

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The largest railway shop in the world is, according to one authority, that of the London and Northwestern Railway, at Crewe, which employs 10,000 men. A rival claimant for the distinction is Altoona, Pa., where the Pennsylvania Railroad employs 12,000 men in the busy season.

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City convenience at one-half—and less—the cost. Running water in the house and barn or garage—all you want of it at the turn of a faucet. No hand pumping—all the fuss and bother left out. A

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6-inch Motor Improved construction, absolutely perfect, runs your washing machine and a hundred other things. Power for small tools. ¼ horse power on ⅜-inch pipe, 80 pounds pressure; 1 horse power on 2-inch pipe, 60 pounds pressure. New net price, $5.00 cash with order.

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This is the system which appeals to builders, contractors and architects. It overcomes the opposition to concrete because it offers absolutely **DRY WALL construction.** It saves money for builders, as **no furring and lathing are required,** and it makes **rigid walls** and **fireproof walls.** This is the system which is bound to get you business and give you the advantage over all other products.

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Tear off the corner coupon right now before you turn the page. Let this free book tell you all about this great opportunity which is open to you today. It will tell you all the details of this system, about the Helm Press and the DRY WALL building system. It will show you how easy it is to start a profitable business. It tells how each product is made, how it is cured and sold. Write today. Do it now.

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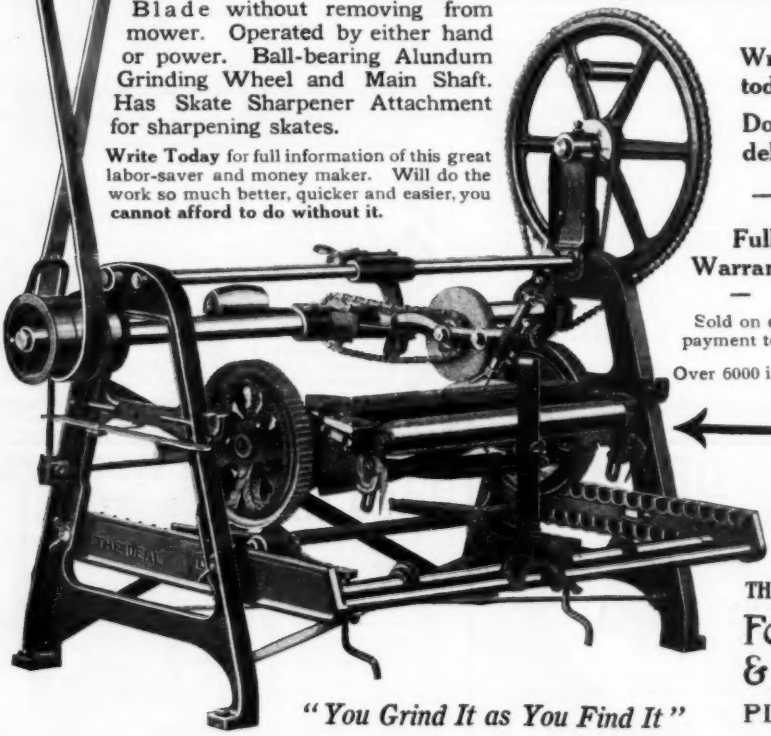

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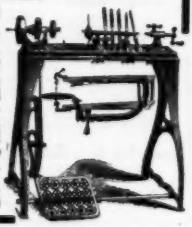
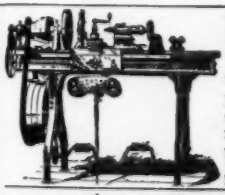
This Lathe Costs You $12

Complete with lathe tools and scroll saw attachment as shown in cut. An ideal outfit for home work or small shops. Well built and highly finished, polished parts nickel plated. Swing of lathe, 5 in. Length of bed, 24 in. Distance between centers, 13½ in. Write for full information. If you are interested in scroll saw work, send 10c for Bowman & Russell catalogue 64 of patterns. We also sell scroll saw wood—all kinds.



ORR & LOCKETT HARDWARE CO.
Lathe Dept., 14-16 W. Randolph St., CHICAGO



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9 to 13-inch Swing

List price $75 and up according to size. When ready to buy send for Lathe Catalog and prices.

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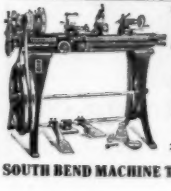

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Screw Holder and Driver

This is a screw-driver that everyone who works on fine mechanisms should have. It is just the thing for watchmakers, opticians, and electricians. You can hold and insert screws in all sorts of difficult places where you could not possibly use your fingers. It saves temper and finger nails. The jaws of the holder will pick up the head of the smallest screw and hold it in place. When not needed the holder may be slipped back on the blade out of the way.

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You need one of the many styles shown in our free catalogue. They are the best built and most practical on the market and it's the up-to-date way to keep tools in good condition and orderly arranged. We ship direct to you and guarantee complete satisfaction.

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Hand Knurling Tool

A small Knurling Tool, seven inches in length, to be held in the hand and is especially adapted for quick, accurate knurling on the smallest possible piece required up to its full capacity of three-fourths of an inch in diameter. Is an addition to the kit that makes the eye sparkle every time it is brought into use. There is no limit to the length of the pieces which can be knurled, the work being well supported between the three knurls. The handle from which adjustments are obtained is hollow and contains the extra set of three knurls, a coarse and fine set being furnished with each Knurling Tool.

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sews leather, canvas, shoes—anything, heavy or light. Complete repair shop in itself. Saves many trips to town. Mends harness, saddles, wagon covers, blankets, buggy tops, belts, etc. Can't get out of order. Original and only awl with diamond point full grooved needle to protect the thread. BIG MONEY FOR AGENTS.

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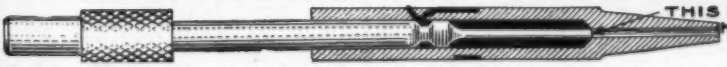
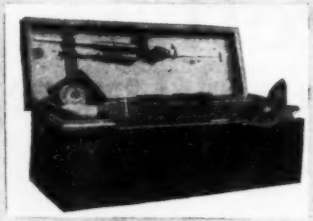
THE EXCELSIOR BRAD SET. PRICE 25 CENTS

Takes No. 18 and No. 20 Brads from ¼ to ¾ in. long



The tool illustrated above will be indispensable to the Pattern Maker, Cabinet Maker, or Picture Framer who purchases it. It will set brads in places that would be inaccessible without it, and dispenses with the brad awl and nail set. If, after a fair trial, you are not satisfied that you have received your quarter's worth, your money will be promptly returned to you on receipt of tool. **Standard Tool Supply Co.,** 140-142-144 W. 22d St. NEW YORK CITY

The Tool Chest is Not Complete Without a Carborundum Sharpening Stone



GOOD tools are not the only needs of the carpenter, craftsman or the man who tinkers about the house—a good sharpening stone—a Carborundum Sharpening Stone—is the other necessity.

It's the stone that cuts—gives a keen, smooth edge—an edge that quickens and improves the work—an edge that lasts.—The Carborundum Stone properly cared for will not glaze or fill,—it is uniform throughout,—always fast, free, and clean cutting.

Carborundum Round Combination Bench Stone No. 107,	$1.00
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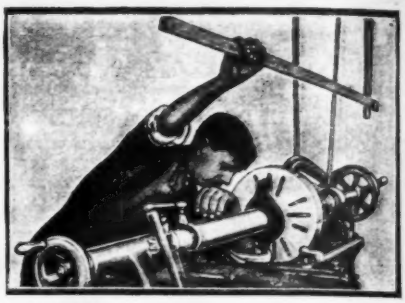

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is a reasonable defense and the removal of imminent danger will increase your value to employer

"Vulcan" Safety Lathe Dogs

eliminate dangerous contact with clothing and cost **no more** than **dangerous** kinds.

Send for free catalogue of dependable tools.

J. H. Williams & Co., Superior Drop-forgings
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We are sole makers of this simplest form of Safety Dog

any implements, except a round piece of wood about 6 in. long and ½ in. in diameter, and a needle, the older girls and women, and sometimes the men also, weave the nets. Each mesh is knotted in much the same way that fish nets or hammocks are made, only, of course, tying a single hair is a more delicate and difficult task than tying a string. According to the American Consul at Kehl, the work is poorly paid. The rate is unusually low at present—about 19 cents a dozen nets of ordinary color. This means that a

FOR MENDING HARNESS

shoes, tents, awnings, pulley belts, carpets, saddles, suit cases, buggy tops, dash boards, or any heavy material. **Stewart's Automatic Awl** is the only perfect Sewing Awl.

It takes a wax thread, feeds from spool and does the work of any harness maker machine. It is indispensable for farmers. Agents wanted. Sent prepaid for $1.25. Send at once for catalog.

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Measuring Tapes and Rules

Send for sample piece of **instantaneous reading** tape and our complete catalogue.

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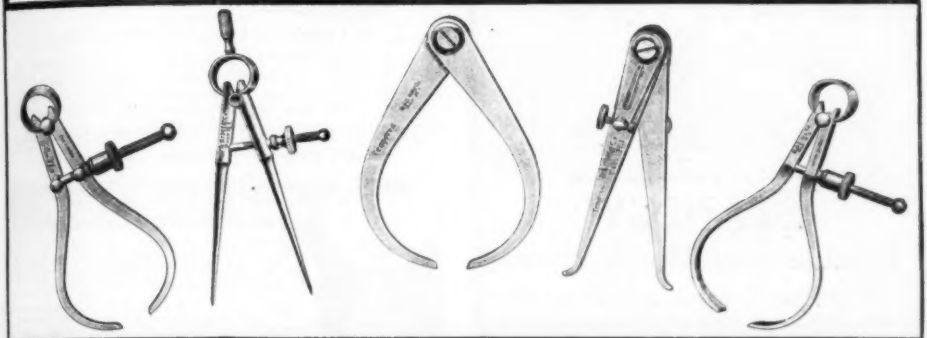
There is a B. & S. Caliper and Divider for every purpose for which one is needed.



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worker must tie about 12,000 knots to earn that sum, besides knotting the hair together, adjusting, counting, folding, and packing the nets. To make a dozen nets is a day's work of 10 or 12 hours.—Journal of the Royal Society of Arts.

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Constructed of hardened steel, well and truly made. Holds any shape of stock down to No. 60 Drill. Write for Catalog E.

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That Fits Your Pocket

A mighty handy, convenient tool. It has all the good qualities of larger and more expensive borers.

Star Borer No. 8

has eight numbered cells in the handle holding eight drill points ranging in size from 1-16 inch to 11-64 inch. Cell No. 9 contains a small screwdriver to be used when the tool is compressed.

Price $2.00. Look for the name MILLERS FALLS

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The **Speedy Stitcher** is the latest and best of anything ever offered for $1.00.

Agents make over 200% profits.

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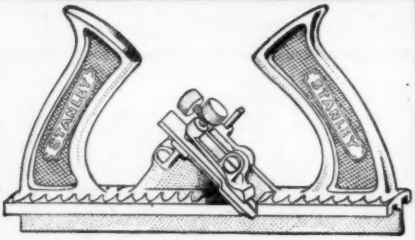
Most Practical, Durable and Convenient Instrument Made

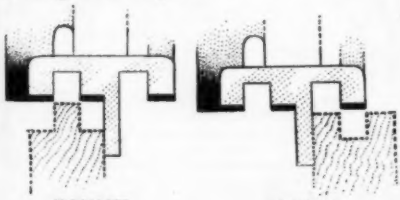
At one glance you can get the true slant on any line or grade either in degrees, inches or percentage, or all at the same time, and will at once give the exact distance needed to plumb up to a true level. The additional spirit level glass now placed in middle of instrument with points on dial will give 3 grades for leveling. The longitudinal recess shown in cut is well worth the low price of the instrument. Write AT ONCE for circular and Testimonials. Special Introductory Price given to First Applicants with privilege of taking Agency. Address **EDWARD HELB, Mfr., Box 75, RAILROAD, PENNA.**

Stanley Tools



STANLEY
Double End Match Plane

This Plane cuts a tongue on the edge of one board to fit a groove in the edge of another board, so that when put together the surfaces of the boards come true. The straightness of both tongue and groove, and their distance from the surface, is governed by a fence. This fence is so designed that the distance of the groove from the side the fence engages is practically the same as the width of the groove. The distance of the other side from the groove depends upon the thickness of the board and the capacity of the Plane. When grooves are cut on center the joint is practically of equal strength in all parts.



TONGUE GROOVE

The tongue tool has one edge wider than the other, which overhangs one side when tonguing on center. Both tongue and groove are cut by working the tool in the same direction by merely reversing it end for end. The Plane is nickel plated and has iron handles cast with the body. Made in three sizes.

Our Catalogue No. 34C contains complete description

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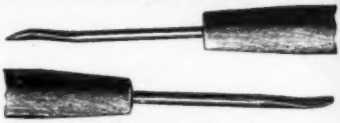
Stanley Rule & Level Co.
NEW BRITAIN, CONN. U.S.A.

Please Mention Popular Mechanics

Make Things of Leather



No. 1 Double Ended Leather Working Tool, 50c

You can make hand bags, pocket books, card cases, a hundred useful and attractive things in leather. It's fun and it's easy to learn. An investment of 50 cents in tools will start you. Send for our Arts and Crafts Catalog 24.

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STOP THAT LEAK

TRADE MARK
Solderene
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and a Candle are all you need to make a permanent repair.

Full directions with each stick. It requires no skill. Anybody can use it. Price, Ten Cents.

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Double Screw Binding Clamps

The illustration shows the use of the double screw clamp for boat plucking or sheathing; it does away with all wedges or binders and the sockets on ends of screw prevent the jamming or marring of the wood. These Clamps are made in six sizes. Write for Circular C and Price Lists.

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"Are the BEST and They ARE the best."

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A New and PRACTICAL TOOL Just Perfected

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will also drill oval, rectangular and bellbound holes. Made of the best steel in 1/8, 1/4, 3/8, 1/2, 5/8 and 1" sizes for metal or wood, 2 kinds; will last a lifetime. Special or larger Sizes made to order. To advertise PRICE ONLY $1.00 PER SET of Drill and Guide. Sent prepaid on receipt of amount. Particulars free.

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Portable Cases

FOR TOOL MAKERS AND MACHINISTS

Twelve styles, felt lined drawers, solid brass trimmings, best of material, beautiful finish, low prices, satisfaction guaranteed. Ask for booklet of cases built for service.

The Pilliod Lumber Co.
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and other high-class Tools are shown in "THE TOOL-MONGER" — its 375 pages, and will be mailed on receipt of 5 cents in stamps.

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To the Man Without A College Education

The **Winslow** strength computing **Slide-Rule** gives engineering skill and accuracy. **Adds to his earning power and prestige.**

WINSLOW STRENGTH COMPUTING SLIDE-RULE

Makes minutes do the work of hours and will pay for itself in one day's use. Solves any beam problem in six seconds or less. Invaluable to Draftsmen, Estimators, Builders, Engineers, Architects, Superintendents. **New** — Nothing else like it at *any price*, the shortest, surest, simplest method of instantly solving all questions concerning strength of beams of **any material, any size, span, spacing** or **load.** Direct reading and easy to operate — "just push one slide and read the answer" — With a W-S-R you have a great advantage over the other fellow and save worry, time and money. Used and indorsed by eminent engineers and architects. Made of German Silver. Size 3 1-2 in. x 10 1-2 in.—in cloth covered case, with valuable book of instructions.

Special introductory price $10.00
Leather pocket case 50c.
Money back guarantee. Agents wanted.

Descriptive Booklet Free

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Steinway Hall, Chicago, Ill.

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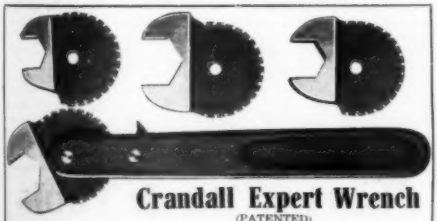
◆ ◆ ◆

The total number of cattle on farms in the United States has decreased 20 per cent in the last five years.



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(PATENTED)

Here is the wrench you have been waiting for. Goes into all the close and difficult places. Ratchet can be worked in one inch of space. Does what 56 solid wrenches can't do. Changes jaw sizes in 5 seconds without extra tools. Drop forged steel and case hardened. 4 sizes jaws and handle in neat duck case, only $2.50 the set, at your dealer's or sent direct, charges paid on receipt of price.

Ask for descriptive circulars. Live salesmen wanted

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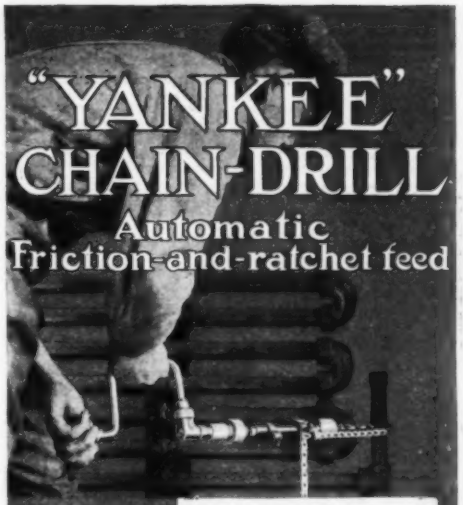
A Guaranteed "RED DEVIL"

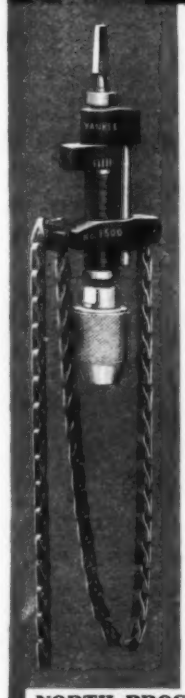
You will want it the minute you see it. It's a Bonded "RED DEVIL" Plier that has to "make good" for TWO FULL YEARS of service or we will replace it FREE.

Ask your local hardware man to show you "Red Devil" Bonded Side Cutter No. 1650. Test it every way. Examine it critically. You will admit it is the finest tool you ever saw. If your local dealer can't supply you send us his name and $1.75 for ONE ONLY sample pair 8 inch. But try your dealer first.

SMITH & HEMENWAY CO., 105 Chambers St., New York, U. S. A.

(Aloyal — Don't fool, insist on owning a "RED DEVIL" Tool)





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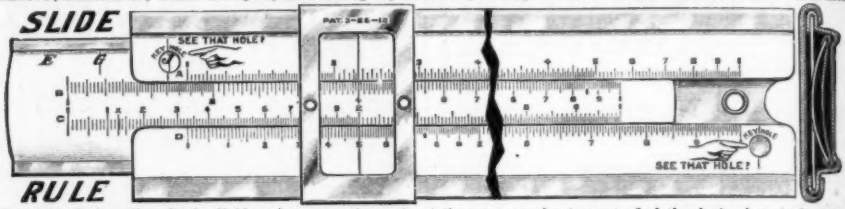

This Slide Rule will multiply, divide, solve proportion, extract the square and cube roots, find the decimal equivalent of vulgar fractions or "vice versa," calculate interest, percentage. Also the mensuration of superficies, and the rule of three. For Engineers, Electricians, Draftsmen, Superintendents, Master Mechanics, etc., the rule is indispensable in their work. It is one of the most valuable instruments ever offered to mankind. For Electricians it is a complete wire table in itself. The Richardson Direct Reading Slide Rule is specially designed for those who wish to learn its use. Its operation being very simple. You simply place the key to the problem wanted in the keyhole (the key is printed in red on slide, see cut) and answer is given direct: such as the Horse Power of Engines, Pumps, Boilers, Belts, Water Falls; size of duct for ventilating; radiation and size grate, and steam main; change gear and pulley problems; areas, circumference and diameter of circles. This Rule is my 19th type now on the market for the first time. Made in **two** sizes, **coat** and **vest** pocket 11x1½x¼ and 5⅝x1⅝x¼. 11" has Sine, Log, and Tangent scales. No **wood** in their construction, scales white celluloid, printed from **engine divided** plates in two colors, and **washable,** secured by an improved locking device in an absolutely non-corrodible **Aluminum** and **Monel Metal** framing.

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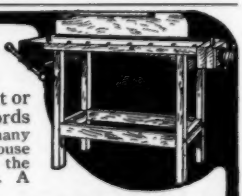

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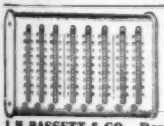

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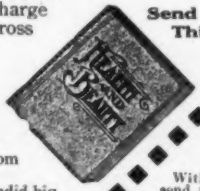

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AGENTS MAKE MONEY. Men or Women. Quick, easy, sure. **All year business.** Experience not necessary. Sells on merit—sells itself. They buy on sight. Every home a prospect. **Every woman needs it.** Price low—all can afford it. **HOW THEY DO SELL**—Even 2 or 3 a day gives $27 to $40 a week profit; 6 sales a day is fair for an agent; some will sell a dozen in one day. Show 10 families—sell 8. Not sold in stores. Send no money. Write postal today for description, agents selling plan. How to get **FREE SAMPLE.**

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any connection with a definite unit or corps. They are neither on the firing line nor with the reserves nor at work on the line of communications. They are just private soldiers in the fullest sense of the term.—London Daily Mail.

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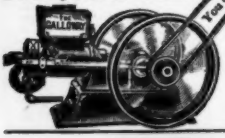

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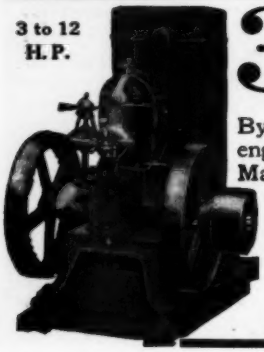

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Runs this 6 H. P. Engine for a 10 hour day on KEROSENE

By means of the patent throttle you can run it as a 4 H. P. engine **for 23 cents a day,** or as a 2 H. P. **for 12 cents a day.** Many other strong points; force-feed lubrication; uniform speed; sight-feed fuel supply; automobile muffler; no cranking; runs either way; uses any fuel oil satisfactorily. And it's **Guaranteed for 10 Years.** Write for catalogue and 30 days' free trial.

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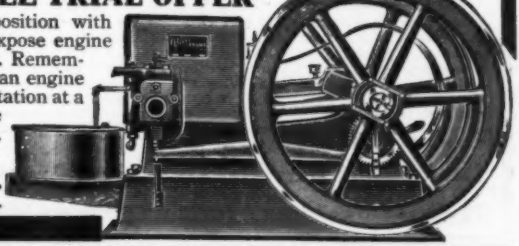
Every Part Guaranteed 5 Years



wreck and ventured an opinion that it might be raised. He was laughed at. That made him angry, so he scraped together some money and bought the sunken vessel. He got divers and tugs and a crew of laborers and after some weeks' work, the boat was hauled off the reef, and with the luck of a plumber she floated. It took some weeks to pump her out and plug her up but finally she was brought to Boston. The cargo was sold and it is said that Mr. Jackson will make about $100,000. —Engineering and Contracting.

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3 H. P. Single Cylinder . . 30 lbs.
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A strictly HIGH GRADE Motor that will give CONSTANT and EFFICIENT service. Especially adapted for CANOES and LIGHT BOATS. Aluminum base, copper water jacket, steel shaft, bronze bearings.

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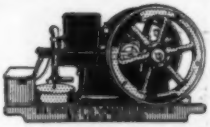

Use my vanadiumized 20 year engine for 10 whole days without a cent down. Then, if you are not perfectly satisfied that my engine is the best, send it back at my expense and you will not be out a cent. Cash on easy payments if you want to keep it. **Write today** for particulars of this offer.

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Saves 1/2 Fuel 2/3 Weight Gives Most Power

The Only Engine that Has Solved the Problem of Violent Vibration

This is the famous TEMPLE which stands on its feet — the up-to-date *Economical Engine* that has won every prize contest against well known makes. *Practically no vibration!* Explosions take place low down close to the ground which absorbs and does away with the shock and strain on the engine. In every other engine explosions occur high up, causing violent vibrations that reduce life of engine. Crank Shaft over Cylinder secures perfect lubrication by gravity. No other engine has this! "TEMPLE," alone, has downward lubrication — hence *less friction and greater power from every pint of fuel!*

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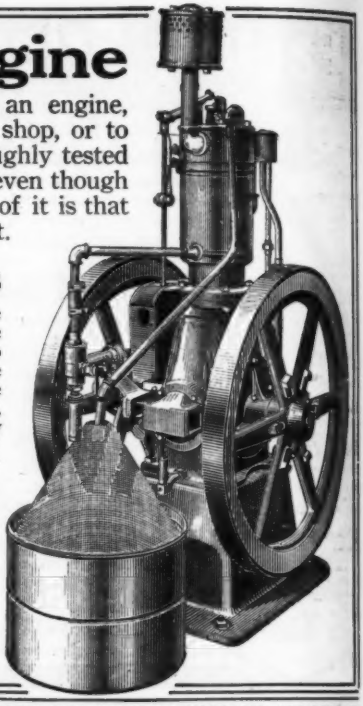
Buy a Tested Engine

For whatever purpose you may need an engine, whether it be for running an experimental shop, or to furnish power for your business, buy a thoroughly tested engine. It is always cheaper in the long run, even though it costs a little more at first. The best part of it is that you are always sure of power when you need it.



I H C Oil and Gas Engines

are thoroughly tested before they leave the factory, and are again tested when they are installed in the purchaser's place of business. Before you buy it, the I H C engine has to prove its capacity for your work. Besides testing the engine thoroughly, and knowing exactly what it will do, we guarantee it against defective material or workmanship, and look after the welfare of the purchaser for practically the whole life of the engine.

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The No. 2 Eclipse Engine

Thousands of our No. 1 Eclipse Engines are in use today for pumping and running light machinery. Now comes our No. 2 —an engine twice as powerful as the No. 1, but of the same simple design, compact construction and high qualities. Either one furnished with or without pump jack.

A Surprisingly Big Value

We have the facilities to build these engines cheaply and well. Take advantage of it. You can use them for pumping, running feed grinder, wood saw, churn, printing press, linotype machine, etc. Write us—learn what an immense amount of work these engines will do; how low their operating cost.

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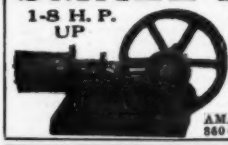
1-8 H. P. UP



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1½ to 350 H. P.
Gas, Gasoline, Oil and Producer Gas

Includes all types and sizes to meet every engine need. Simple to operate—low fuel cost—substantial construction. Perfectly balanced, smooth, steady, reliable. Sales branches and stocks everywhere. If you expect to buy an engine our expert will tell you what is best and cheapest for you.

INTERNATIONAL GAS ENGINE CO.,
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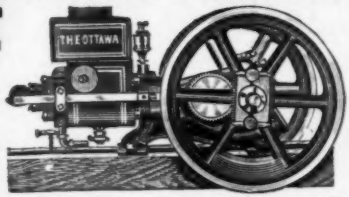
2 1/4 HORSE POWER



Here's the most reliable farm or shop engine in America.

I absolutely know that it will **wear longer and do more work** than any other engine of the same size you ever used. That's why we can say to you TAKE IT — USE IT. Send us just one-half of the purchase price or

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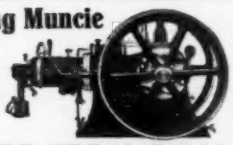
The Money Making Muncie



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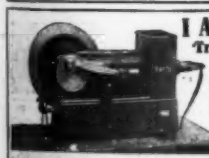

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Try me for 10 days

This is our 1-2 horse power Gasoline Engine fully equipped. Switch, Coil, Spark Plug, Gasoline Tank, Mixing Valve all ready to run. Fully Guaranteed. Return if not satisfactory and money refunded. Will run Washing Machines, Cream Separators, Butter Churns, or any light machinery where small power is required. **Inclose 2c stamp for reply.**

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Largest Builders of 2-cycle Motors in the World. Over 1000 responsible dealers.

3 H.P. with Complete Outfit ready to install $55
ALSO 4 AND TO 36 HP

Guaranteed by a big responsible concern. Write for big catalog—*tells* and *shows* you all about these high grade motors and how they are made.

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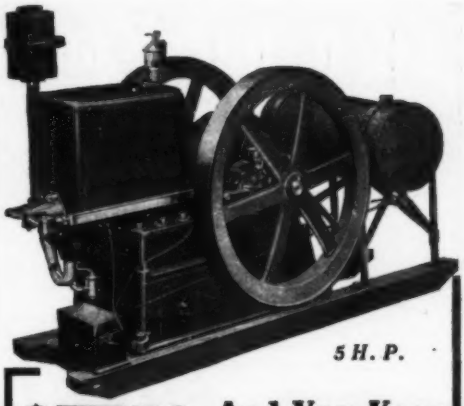

5 H. P.

$7.50 And You Keep This Great Engine

We will ship you any one of Schmidt's Chilled Cylinder Gasoline Engines for a 10 days free trial. Your choice of sizes, horizontal or upright, water cooled or air cooled. Then, if you don't want it send it back at our expense. If you wish to keep it, pay as low as **$7.50 and you can pay rest in easiest monthly payments.** You get the engine at the Rock Bottom Price—the same price that even the wholesale dealer has to pay. Send coupon or a postal card for full particulars.

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The Speediest 16 ft. 25 H. P. Hydroplane in the World

Other 16 ft. boats can't touch this speed by several miles and *they cost four times as much.*

The Mullins Steel Hydroplane

is a speed marvel. Think of a boat 16 ft. long keeping up a 28-mile clip without straining the hull in the least. Water-tight, because built like a Government Torpedo Boat of tough, puncture-proof galvanized steel. Sustained vibrations of engines at top speed have no effect on plates. 18-25 H. P. Pierce-Budd Engine, complete with Clutch and Bosch magneto.

Fastest lowest-priced hydroplane in the world.

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151 Franklin St., Salem, O., U. S. A.
The World's Largest Boat Builders.

Makers of the famous non-sinkable Motor Boats, Row Boats and Cedar Canoes

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FREE!

Our 1913 Catalog

will be sent free upon request to any address. It contains illustrations of our 17 different models of the most efficient engine ever made. It gives you detailed descriptions of the **Strelinger** four cycle, heavy duty Marine Engines, 4 to 40 H. P. Of our **Little Giant** two cycle, three port, general utility Marine Engines, 1 to 16 H. P. and of the **Junior** line of Stationary, four cycle engines, 1 to 11 H. P. This catalog is concisely and clearly written and contains information that you should have—write for it now while you have it in mind.

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40-MILE HYDROPLANE

$4.00 for full set of Building Plans and Instructions. *Limited Offer. Write today.*

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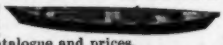
BUILD YOUR OWN STEEL BOAT

From patterns and printed instructions. **Save ⅔ Cost.** Work easy. Material furnished. Also finished boats. Send for catalogue and prices.



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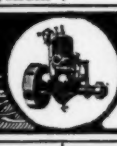

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The kind that make boating a pleasure. When you start you know there'll be no engine troubles to mar the trip. A marvel of smooth working simplicity that the non-mechanical can easily understand and operate. Complete, guaranteed. 2 cycle, 2 port 1-2x3 1-2, 4 1-2x4 1-2.

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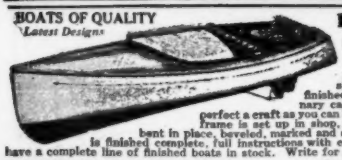

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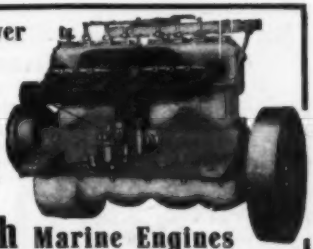
4 Cylinder
4 Cycle
Weight 370 lbs.
Speed 600 to 1000 R. P. M.



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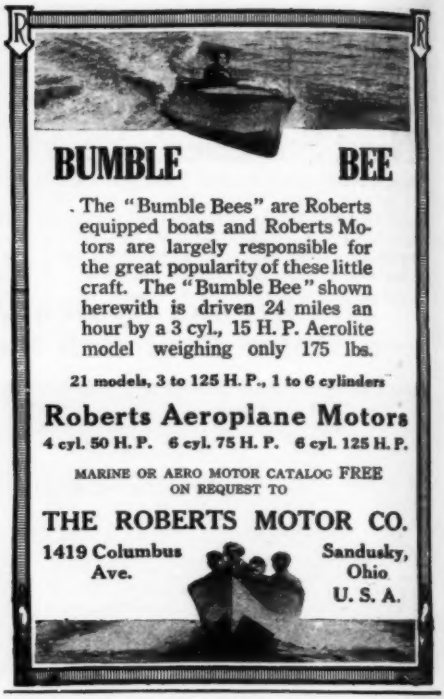

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The "Bumble Bees" are Roberts equipped boats and Roberts Motors are largely responsible for the great popularity of these little craft. The "Bumble Bee" shown herewith is driven 24 miles an hour by a 3 cyl., 15 H. P. Aerolite model weighing only 175 lbs.

21 models, 3 to 125 H. P., 1 to 6 cylinders

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4 cyl. 50 H. P. 6 cyl. 75 H. P. 6 cyl. 125 H. P.

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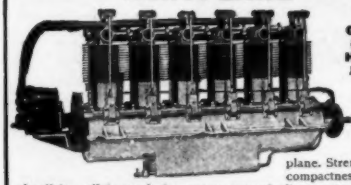

MODELS
G-2 16 H. P.
I-4 35 H. P.
H-6 55 H. P.
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Designed and built to the requirements of the Aeroplane and Hydroplane. Strength, reliability, compactness, lightness, simplicity, efficiency, fuel economy, ease of adjustments, ease of starting, and minimum head resistance, the ten most important points, and our motors contain these features. Built by skilled mechanics and only the best of material and equipment used. It will be better and cheaper to equip your plane with a reliable and efficient power plant in the start.

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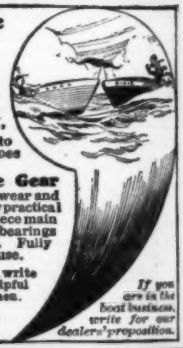
Get on the safe side of motor boating

Equip your boat with a Baldridge Reverse Gear. Then you will never fear danger of collisions—for the "Baldridge" gives you automobile control. Moving a single lever stops, reverses, or sends your boat ahead—engine doesn't stop. The "Baldridge" marks a boat and its owner as "up to date", just as the "self-starter" does the automobile.



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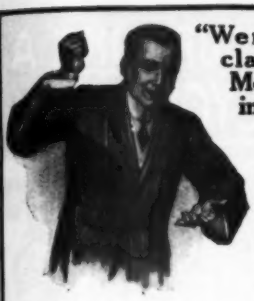

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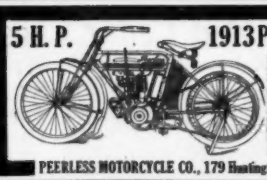
Licensed Coaster Brake Manufacturers

5 H. P. 1913 Peerless Motorcycle



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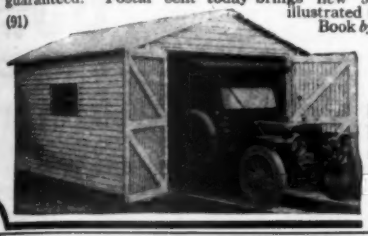

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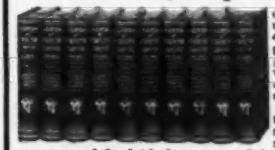

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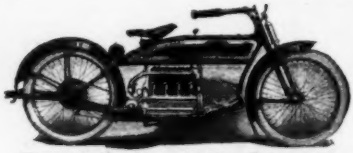

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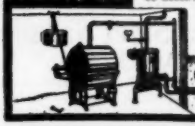

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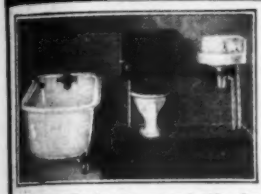

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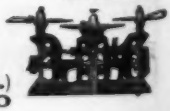

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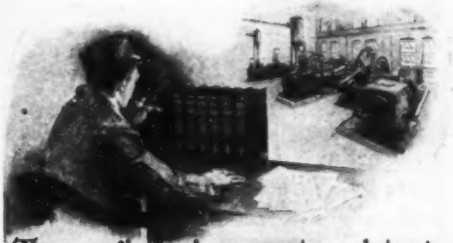

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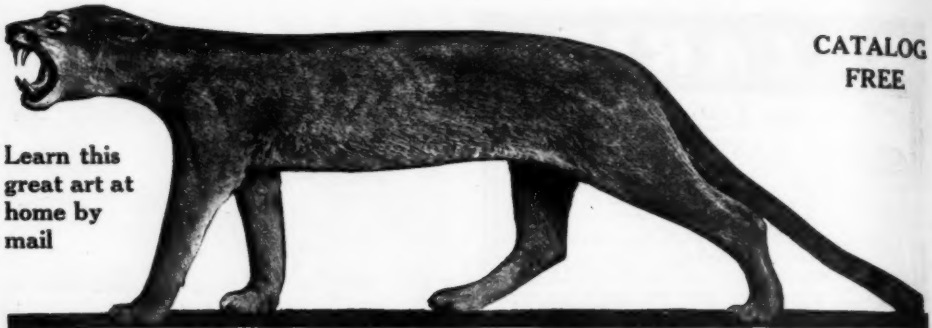

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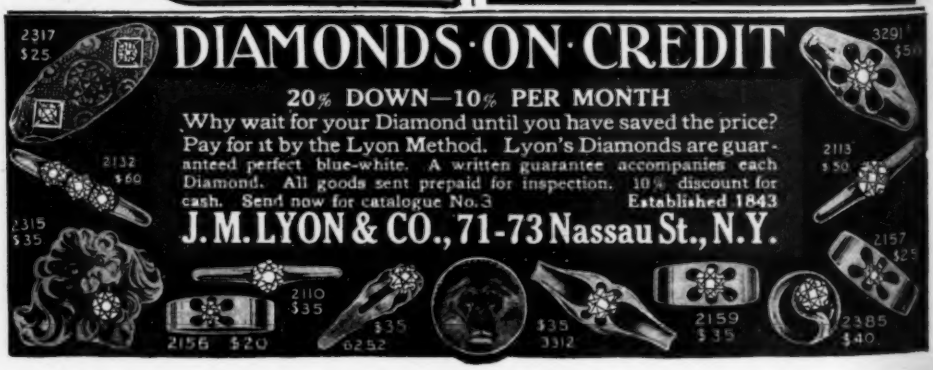

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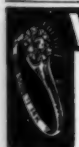

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What I want is the right kind of men. Don't bother about the expense. I give each one of my students personal instruction. If your work is right, I tell you so. If it is wrong, I tell you just exactly where it is wrong. There is an urgent demand today for skilled Draftsmen. The big companies are issuing calls every day in the year for men to fill positions paying from $125 to $175 a month to start. Many positions paying $75 to $100 a week always open. Here is your opportunity.

I Guarantee To instruct you until you are competent and placed in a position paying $125 to $175 a mo.

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for the Sweet-Toned

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Piano

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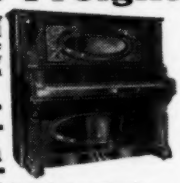
30 Days' Free Trial
We Pay the Freight



You are not asked to **deposit**, or **pay** or **advance** a cent in **any way** until you write us and say that the MEISTER is entirely satisfactory and you wish to keep it. **Then these are the terms of sale:**

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For Men Who Can Talk

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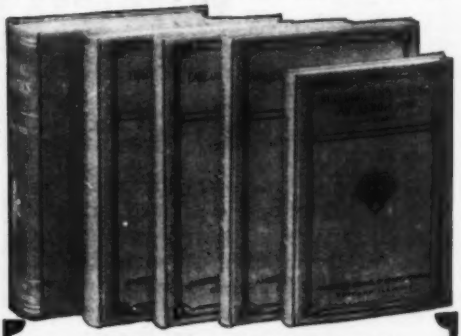

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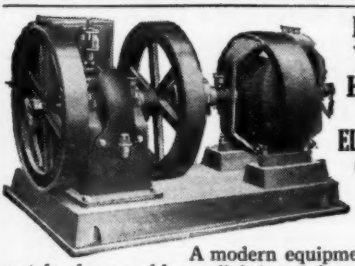

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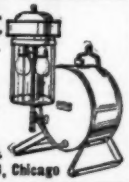

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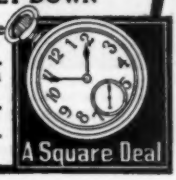

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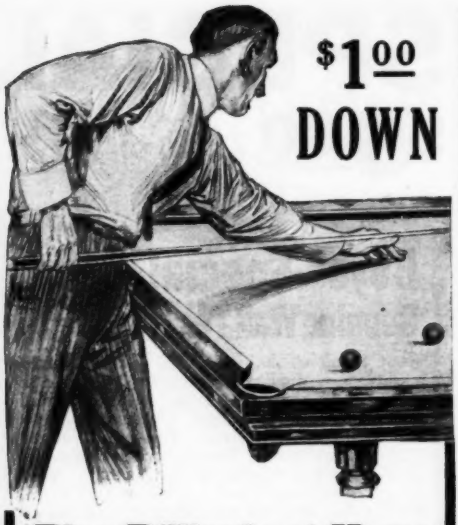

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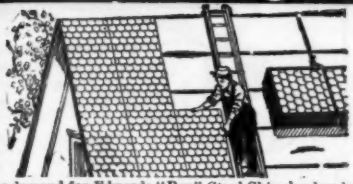

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You don't have to nail these **steel** shingles, like **wood** shingles, ONE AT A TIME. **Put on as high as 100 at once,** for they come in big sheets ready to nail on sheathing or old roof. It's **ten times easier than putting on wood shingles.** No extra materials to buy, no painting to do, no tools to borrow. Your hired man can do the job with a hammer.

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Write at once for our Special Introductory Offer. To advertise and quickly introduce this greatest of all inventions for the deaf, we are going to sell the first lot of these new **four-tone** phones **DIRECT** from our laboratory to users at the jobber's price. This offer applies only to the first lot finished—a limited number. A few dollars, **payable on easy terms, if desired,** secures you complete relief from your affliction. Send the coupon **NOW** and you can save both wholesaler's and retailer's profits.

Free Trial The Mears Ear Phone is sold only on trial. Test it and prove its power to do for you what it is doing for others. Make the test at our expense. Try it for ten days in your own home, under every condition of actual service. If it does not please you, send it back, and the trial will cost you nothing. Remember, the Mears Four-Tone Ear Phone *is not an experiment.* It is merely an improvement upon our already famous Single-Tone instrument.

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If you live in New York call at our office for free demonstration.

The Mears Ear Phone book explains all the causes of deafness; tells how to stop the progress of the malady and how to treat it. Send the coupon at once for Free Book and our Special Limited Introductory Offer. Send at once.

Mears Ear Phone Co., Suite 1193
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New York, N. Y.

COUPON

Mears Ear Phone Co.
Suite 1193
45 W. 34th Street
New York, N. Y.

Gentlemen: Please mail me, free and postpaid, your Mears Ear Phone Booklet and particulars of your Special Introductory Offer on your new model Four-Tone Mears Ear Phone and Free Trial Offer.

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Address .....

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I'll teach you personally—by mail—you'll succeed. Wonderful field—for both men and women. Easy terms. Thousands of merchants need help. Price cards, Sale cards, Window Cards, banners, signs, etc., are used in enormous quantities. Crawford, B. C., writes, **"Earned nearly $200.00 since taking course."** Parrott, Okla., says, **"Earned several times cost of course since enrolling."** Gold lettering on Glass and wood, valuable feature of course. You learn everything from the ground up. When your course is completed you should be an expert. Knowledge of sign and show card writing helps you wherever you are. Thousands employ sign writers. Pay is good—work easy and fascinating—hours short.

EARN $18 TO $35 A WEEK

Many of our students now make more than this operating a business of their own. My instruction is unequalled because practical, personal and thorough. 20 years experience as a sign writer back of the course. Natural talent unnecessary. **Earn while you learn.** Do practice work at reduced prices, —help pay for course. Fritzner, Minn., writes, **"Did job recently and get $10.00, profit $7.05.** Just think—did this after only one lesson." We assist graduates to get positions. Write for large, complete catalog A3, pictures and testimonials of graduates, samples of work, terms, etc. Address me personally.

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Detroit School of Lettering
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"Oldest and Largest School of its kind."

The Whispering Telephone Mouthpiece

Makes Every 'Phone To Which It is Attached a Private 'Phone in the Fullest Sense of the Word.

Attached to your 'phone it will enable you to talk and be distinctly heard at any distance under any and all conditions without raising your voice.

The patented parabolic reflector or small-cone shown in the above illustration is the secret of the wonderful efficiency of this device—it insures an absolutely uniform distribution of the sound waves and so intensifies them as to enable the speaker, without raising his or her voice above a whisper, to send any message in privacy.

Nothing like it in efficiency, simplicity or price has ever been successfully perfected. Every telephone user wants it. Instantly adjusted to any 'phone. Sent prepaid on receipt of the price, 50c. Be sure and mention make of telephone when ordering.

Exceptional Opportunities for Aggressive Agents

The Whispering Telephone Mouthpiece sells on sight. Aggressive specialty salesmen make big money demonstrating and selling them to men and firms who appreciate its value. Write today, for special agency proposition. Address

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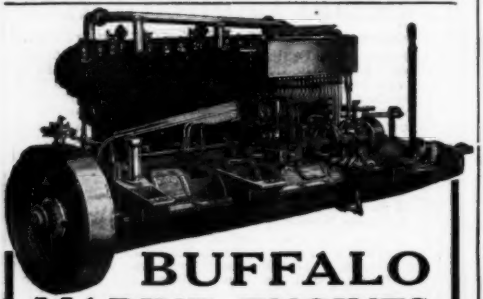
CHICAGO



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They Excel in Reliability

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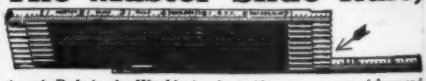

the only **Rule in the World** whereby inside measurements of doors and windows, etc., can be taken rapidly and accurately. It is also far superior to any other rule for outside measurements of walls and ceilings, etc., as it can be extended and closed instantly. **Mechanics, Builders, and Architects, try one today! Don't wait!**

On receipt of 15 cents per lineal foot, a 4, 5, or 6 foot rule will be sent to you prepaid. Large profits to agents. Write for circulars and particulars.

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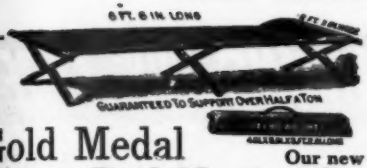

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"Ohio" Tools

Insist on them—it will pay you. Carefully made from specially selected steel—*fully warranted.* Write for complete catalog of

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Learn to Play the Violin or Cornet

Flute, Clarinet, or some other instrument. You'll get enjoyment from it all your life and can make good money playing in Bands or Orchestras if you wish. We include with every instrument an **Instruction Book and Lessons** (by correspondence) **free.** Thousands have learned by this method. Our prices are very low on all musical instruments. We import our Violins direct from best European makers. **Our Special Complete Violin Outfits at $10 are great value.** Others from $2.50 to $25 and up. Cornet Outfits, complete, $9.25 up. **Band Instruments** of all kinds sent on **Six Days' Trial.** We sell for cash or monthly payments. **Satisfaction guaranteed.** Write for free catalog and mention what instrument you are interested in.

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Here's Where Hansen's Gloves Prove Out

You don't need a better demonstration than this of the need of a good, strong *grip*, with the hand protected—wrist and fingers free.

Hansen's Gloves are safeguards in every danger. The stout, soft material of highest-grade horsehide, protects against injury, and the careful "build" *for every man according to his work*—gives comfort, pliancy and freedom.

Ready-made, but practically "made-to-order."

Hansen's "Special" for Ironworkers and Bridgemen, Wide welts protect stitching. Ample wrist covering.

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It contains interesting description of the line. Hansen's Gloves come in all styles adapted to all kinds of work, or sport. The materials stand every test of time and service. That's the *economy* in Hansen's.

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Please send me your Free Book illustrating and describing your styles of gloves and mittens. I am most interested in the following style:

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$38.00 UP

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(This is the 16-foot Ideal)

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16', 18', 20', 24', 26' **$87.00 UP**

$ MAKE 250.00 A MONTH REPAIRING AUTO-MOBILE TIRES

Be first to enter this new big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnson, Tex., writes: "**I made as high as $18 profit in a day.**" Another man who bought a plant September, 1911, writes he has **cleared over $3000.00.** That's going some! Operate a plant as side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

Repair Tires at Home. Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business. **Auto owners**—repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.

HAYWOOD TIRE & EQUIPMENT CO., 607 N. Capitol Ave., Indianapolis, Ind.

POPE MOTOR CYCLES

Pope quality has never been . . . questioned

Three great new features insure your comfort—

Rear Spring Suspension on helical springs that expand, gives you comfort and spring assistance in place of spring resistance. In connection with **The Spring Fork,** the frame, motor and rider are ideally suspended. The combination gives a forward gliding motion that will delight you.

Over-head Valves give the most power, the smoothest running, the greatest speed, least surface exposed to heat, best cooling—most complete exhaust of spent gases—utmost power, least weight, lowest gasoline and oil consumption and minimum cost to run and maintain. The entire explosion is directly over the piston. All energy developed is applied with no loss in time nor force, straight downward, with maximum power.

Pope Motor-Cycles are made in four models

These machines are alike in quality and perfection of detail. Each is suited for a different purpose. **Model H—Lightweight**—4 h.p., belt drive, imported magneto. Weight 160 pounds. A wonderful value, **$165. Model K—The Big Four**—Big 4 h.p., belt drive, imported magneto, over-head valves, spring seat post, **$200. Model M—5 h.p.**—Chain drive. Bosh magneto. Rear spring suspension, over-head valves, **$215. Model L—Twin**—Twin cylinder, 7/8 h.p., chain drive, Bosh magneto, rear spring suspension, over-head valves, **$250.**

Send for the handsome 1913 Catalogue

The finest ever issued. It contains pages of specifications and details, every one of which will interest you. Write today.

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Doesn't this look good to you?

The most artistic and satisfactory homes to-day are being finished with

UTILITY WALL BOARD

Takes the place of both lath and plaster—makes smooth, even walls and ceilings that are moisture proof—that will not shrink or warp—that are easily and quickly put on—without muss or bother—and that will last as long as the house stands—the cost is less than lath and plaster.

LET US SEND YOU A FREE SAMPLE

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Important Announcement

We are compelled to withdraw our Camera offer for a short time, because we are unable to fill orders. At a later date, we will be equipped to supply the people of America with the greatest camera value that has ever been given. We advise you to defer your purchase until you see this remarkable offer, as we are sure you will want to take advantage of it. Look for our announcement which will appear in the next issue of this publication.

NATIONAL CAMERA CO., St. Louis, Mo.

$1.00 A MONTH

One Dollar a Month

Buys a Standard Typewriter

Your choice, Remington, Oliver or Smith Premier. Prices lower than other cash prices. Perfect machines only—guaranteed.

TYPEWRITER INSTALLMENT CO.
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$25 WILTON GOLD FILLED WATCH $9.95

5 YEARS TO PAY

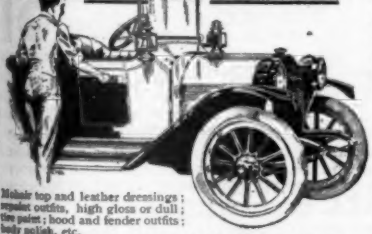
Ladies' or gentleman's famous American made, accurately adjusted Wilton Movement. One of the standard movements of the world. Set in handsomely engraved, new thin model, open face or double hunting "perpetual" double strata gold filled case. Now offered, on our great new "honor" plan—with our guarantee to keep it in repair for 25 years.

Five Years To Pay!

Our "honor" plan of doing business is different. We trust you—ask no questions—require no references. You pay no interest—sign no notes. We don't even look you up. We trust you absolutely. Act quickly. Send no money. Merely say what style you want. We send it immediately for FREE INSPECTION. If satisfactory begin to pay a small amount each year for five years. WE TAKE ALL THE RISK. This is a *lifetime chance*. Send name and address today—at once.

Schiller Watch Co., Dept. 702, Schiller Bldg., Chicago

Paint Your Car Yourself



Mohair top and leather dressings; repaint outfits, high gloss or dull; tire paint; hood and fender outfits; body polish, etc.

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Save $25 to $75. It's Easy

One man in Granite City, Ill., writes, after painting his car with the Arsenal System: "My car looks better than many which were painted in St. Louis at six times the cost." (Name on application.) **What he has done you can do. No experience required.**

"The Car Beautiful" Free to Motorists

This 36 page book, the only one of its kind published, tells how to keep the car looking brand new at small expense at home. It's FREE!

Black Enamelled, Silver-Trimmed Lamps

Special Offer You can have black enamelled, silver-trimmed lamps in half an hour with this combination. One $1 can Arsenal Gun Metal and one $1 bottle Arsenal Liquid Silver, both prepaid, **$1.75**

"Pen-Dar" Lockers have passed the rigid inspection of Underwriters and Architects

"Pen-Dars" are neat in design and appearance, and can be furnished to harmonize with any surrounding.

A postal will bring "Locker Information"

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We can sell you a beautiful one, two, three, four, five or six room bungalow or cottage, **already built.** Shipped to you in sections, finished and complete. You can put it up yourself in a few hours time. **Only a wrench and screwdriver needed.** No sawing, no nailing, no carpenter work whatsoever. Can be taken down, moved and put up again in a day's time. Every part made to fit to perfection. **Absolutely windproof, waterproof and stormproof.**

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For permanent and portable summer and winter homes, artistic cottages, garages, school houses, churches, stores and hunters' cabins.

Warm in winter, cool in summer. Made of best lumber. Everything finished and complete. All doors and windows hung. All necessary hardware furnished and already set.

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Amazing Profits In Mushrooms

Anybody can add $8 to $40 per week to their income, in spare time, entire year growing mushrooms in cellars, sheds, barns, boxes, etc. I tell you where to sell, at highest prices.

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SOLDERERS! Send for "Kink" No. 2, containing 25 soldering suggestions. **It's FREE**

NEW WALGER PIPE $1

GOOD LIVE AGENTS WANTED

POSTPAID

Durable and simple. Cleaned in a jiffy. Always a cool, sweet smoke. Has genuine briar bowl, sterling silver ferrule, patent hard rubber mouth piece, with German Silver cleaning spoon. To clean pipe, remove mouth piece and wipe spoon.

FREE WITH EACH PIPE This heavily nickeled plated pipe lighter with pocket clip; carried like a fountain pen; strikes like a match, can be lit in the wind.

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FIRE DETECTED IN 1/2 MINUTE

OUR Automatic Fire Alarm unit secured to the ceiling detects the slightest fire in one-half minute, even one sheet of burning newspaper will ring the alarm. For factories, offices, garages and public buildings.

One unit protects 1000 sq. ft., cost of installation 1 cent per sq. ft., any one can install it. Portable outfit for household protection, complete unit, can be installed for $5.00.

Big Money MADE BY HUSTLING AGENTS WRITE OR WIRE FOR TERRITORY

We take the risk, 15 days' free trial, no money required in advance. We pay the express.

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Health? Take Turkish Bath at Home—Only 2 Cents

Physicians are abandoning drugs for this new treatment. If your mind or body is tired, open your pores and feel the rapid change in your condition, at cost of 2c a bath. **The Robinson Bath Cabinet** is the only scientifically constructed bath cabinet ever made for the home. **Great $2 Book Sent Free**—"The Philosophy of Health and Beauty". Write today. **Agents Wanted. ROBINSON MFG. CO., 319 Robinson Bldg., Toledo, O.**

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Your's, Free

The sport with a thousand thrills! All you want to know about it—practical hints, the true how and why—and all the little tips and inside facts about this trickiest of game fishing are put up to you right in **That Free Heddon Book about Bass Casting**

It shows you in sumptuous colors the outfit you want—Heddon's Genuine Dowagiac Split Bamboo Rods and Dowagiac Artificial Baits—the most scientific, certain and humane of lures.

JAMES HEDDON'S SONS, Dowagiac, Mich.
Box 100 (Pronounce it "Do-wah-ji-ack")

THE FLYING MERKEL

The Only Self-Starting Two-Speed Motorcycle in the World.

SEND FOR CATALOG JUST OUT

THE MIAMI CYCLE & MNFG. CO.
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EARN $3000.00 THIS YEAR

Realize your ambitions! Grip success! Here's a wonderful opportunity to make an easy start. Send for one of our money making B. B. Vacuum Cleaners on

30 Days' Trial

Try out the proposition 30 days—see how much there is in it. It's the very opening you've been looking for. One of the most wonderful money making propositions ever invented. The headline is conservative—**$15 to $30 a day** should be easily made. Some work three machines—operate one themselves—hire men to work the others. They make big profits from others labor.

Big Demand for Professional Vacuum Cleaners

Every home has to be repeatedly cleaned. Everybody now wants vacuum cleaning. It's the new, easier, better way of cleaning. Nobody wants to tear up carpets and rugs and pound them to pieces. There's a big demand for the man who can clean the whole house—rugs, mattings, carpets, mattresses, pillows, portieres, curtains, upholstered furniture, etc.—do the whole job in a few hours without turning the house upside down. One man can clean ordinary home in four hours. O. A. Rainbow, Mex., writes, **"The B. B. does all you claim. It will knock out from $20 to $25 in six hours easy."**

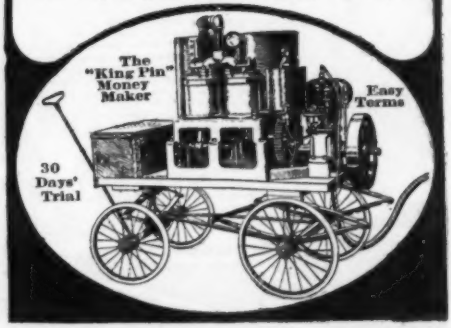
One woman engages you—then next door neighbor. So is goes. Think of the homes that need cleaning—churches, halls, lodge rooms, hotels, etc.—extra big jobs and extra big money. You should be busy as a bee. Work is easy and fascinating. Always a crowd around your machine. They advertise you. You get phone calls—business—business—business—all the time. When money is earned—it's yours—all of it. A. W. Staley, Ill., writes, "It is the greatest dirt puller I ever saw. I can make $20 a day with it which I think is good for the investment. I have three or four regular customers by the month."

Let Your Profits Pay For Machine

We sell for cash or on installments. You should earn money from first day. **When payment comes due, pay it out of your profits.** The B. B. Vacuum Cleaner is a wonder—simple—reliable—complete. Has all the latest attachments and improvements of best quality. **Protected by Kenney basic patents.** We are glad to send it on 30 days' trial. We know it will make good.

Send today for free book and full particulars regarding our 30 days' trial. A 2-cent stamp brings it. We tell you how to start—how to get business and make a success. Now is the time to start. Be ready for the spring rush. Remember you might just as well make $2500 to $3000 or more this year.

McCreery Mfg. Co. 932 Door St., Toledo, O.



Prest-O-Lite

The Only Practical Light for Motorcycles

Prest-O-Lite is the only lighting system that makes night riding possible, pleasant and SAFE.

The ready-to-use gas costs no more—usually costs less—than the carbide a generator consumes.

The first cost is low [$10]. Prest-O-Lite never gets to be second-hand, and is always a READY CASH ASSET.

You can easily afford it. You cannot afford to be without it if you ride at night. One accident might cost you more than years of Prest-O-Lite service.

Easily attached to any motorcycle. We will arrange for immediate exchange service for anyone, anywhere.

See any motorcycle (or automobile) dealer, or write us.

DON'T ACCEPT AN IMITATION!

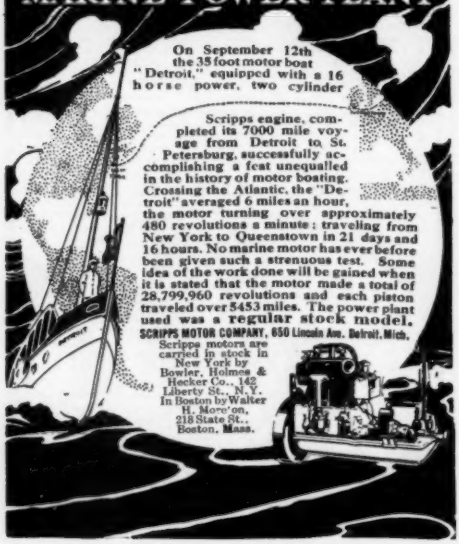
The genuine Prest-O-Lite, when empty, can be immediately exchanged for a full one, ANYWHERE AND ALWAYS. Imitations cannot.

The Prest-O-Lite Co., Indianapolis, Ind.

Branch offices and Service Stations in all principal cities. Charging plants in all parts of the country.

Exchange Agencies Everywhere

THE SCRIPPS COMPLETE MARINE POWER PLANT



On September 12th the 35 foot motor boat "Detroit," equipped with a 16 horse power, two cylinder Scripps engine, completed its 7000 mile voyage from Detroit to St. Petersburg, successfully accomplishing a feat unequalled in the history of motor boating. Crossing the Atlantic, the "Detroit" averaged 6 miles an hour, the motor turning over approximately 480 revolutions a minute; traveling from New York to Queenstown in 21 days and 16 hours. No marine motor has ever before been given such a strenuous test. Some idea of the work done will be gained when it is stated that the motor made a total of 28,799,960 revolutions and each piston traveled over 5453 miles. The power plant used was a **regular stock model.**

SCRIPPS MOTOR COMPANY, 650 Lincoln Ave. Detroit, Mich.

Scripps motors are carried in stock in New York by Bowler, Holmes & Hecker Co., 142 Liberty St., N. Y. In Boston by Walter H. Morse'on, 218 State St., Boston, Mass.

Please Mention Popular Mechanics

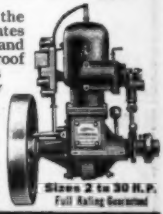
1913 CAILLE PERFECTION

Here's the Achievement of a Mechanical Ideal, the success of which guarantees an Efficient motor boat, in that it permits the conservation of your motive power.

Power when and where you want it—real full rated horse-power harnessed into one complete, accurately balanced power unit—straight line drive transmission system and a drive shaft that is all twist, all energy, all leak-proof—that's the Caille Perfection Marine Engine for 1913. A triumph of engineering skill that has excited the wonder and admiration of the entire engineering profession.

This Engine 100% Right The Sensation of 1912

The Caille Perfection Igniter was the sensation of 1912. The Igniter obviates the use of magneto, timer, batteries and coils and insures you a trouble-proof engine. This Igniter equipment is embodied in the 1913 Caille—why not get the free catalog for complete details and description.



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Reaping Rewards from Resolutions

By FRANKLIN O. KING

Do You Remember That Old Story about Robert Bruce and the Spider? Robert was Hiding in a Cave. His Enemies Had Him "In the Hole," Temporarily, So to Speak, As It Were. While Reflecting on the *Rocky Road* to *Royalty*, Robert, the Bruce, Espied a Spider Spinning His Web Over the Entrance to the Cavern. Nine Times Did the Spider Swing Across the Opening in a Vain Attempt to Effect a Landing, but the Tenth Time he Touched the Home Plate, and Robert, admiring the Persistence of the Insect, Cried Out Loud—"Bravo," Two or Three Times, One Right After the Other. Shortly After That Bruce Got Busy and Captured a Kingdom.

All of This Preamble is Intended to Point a Moral, which is—"If At First You Don't Succeed, Slap on More Steam, and Sand the Track." In This Connection I want to Inquire about Your New Year's Resolutions, and to Ask If You Have Kept the Faith, and If Not—Why Not? *I Believe the Pathway to Prosperity is Paved with Good Resolutions. Therefore, let Us Resolve, and Keep Resolving until Victory is Perched on our Banners.* Remember, You Have Fought Many a Victorious Waterloo that the World Knows Nothing About. The Man who Gets Up every Time He Falls Down Will Some Day Cease to be a "Fall Guy." *Good Resolutions Will Be Rewarded with Rich Realizations*, and It Shall Follow as the Night the Day.

Two Texas Gulf Coast Products

How Much Better Off are You than Last Year, or the Year Before That? Perhaps Your Wages are a Little Higher, but Have not Your Expenses More than Kept Pace with That Increase? Aren't You Paying a Little More for Your Clothes and Your Meals, and don't You Smoke More Expensive Cigars and more of Them than Formerly? If It isn't Cigars, It may be Something Else—Some More Expensive Habit.

A Man Begins To Go Down Hill at Forty, and the time may come when a Younger Man—perhaps a *Cheaper Man*—will fill your job. The Man Who-Looks-Ahead will prepare himself for that time by getting a Home. My advice to You, therefore, is to Get a Home while you are able to do so—and Begin Now. I would further advise you to Get a Home in the Gulf Coast Country of Texas.

Since Investigating Conditions in the Rain Belt of Gulf Coast Texas, I have no Fear of Old Age or Poverty, because I know I can Take up a Few Acres down there and be *Absolutely Independent.* I am Firmly Convinced that with *Average Intelligence* and *Average Industry*, any Man who is now Working His Head off in the North to make a Bare Living, where they Snatch One Crop between Snowstorms and Blizzards, can soon Lay Up a Nice Bank Account in the **Winter Garden of America.** Come to the *Land of Least Resistance*, where You can Grow Three Big Money-Making Crops a Year on the Same Soil and Without a Dollar's Worth of Expense for Irrigation or Fertilization.

I believe you could save Twenty-Five Cents a Day if You Tried. I know you would Try if you Realized that our Growers of Figs, Strawberries and Early Vegetables clear a net profit of $300 to $500 an Acre. Men have Realized more than $1,000 an acre growing Oranges in our Country. Remember that our Early Vegetables get to Northern Markets in Mid-Winter and Early Spring, when they command Top Prices.

One German Truck Grower on adjoining lands last spring realized nearly $500 from three-fourths of an acre of Strawberries. You could do as well if you only Tried, and on a Ten-Acre Tract **Find Financial Freedom.**

The Biggest Price paid for a car of watermelons on the Houston Market last year was $140. The car was shipped by the Danbury Fruit and Truck Growers' Association.

We are situated within convenient shipping distance of Three Good Railroads, and in addition to this have the inestimable Advantages of Water Transportation through the Splendid Harbors of Galveston and Velasco, so that our Freight Rates are Cut Practically in Half. The Climate is Extremely Healthful and Superior to that of California or Florida—Winter or Summer—owing to the Constant Gulf Breeze.

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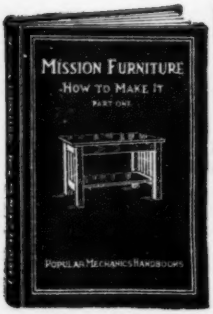
Write for our Free Book, which contains nearly 100 Photographs of Growing Crops, etc. Fill Out the Blank Space below with your Name and Address, plainly written and mail it to the Texas-Gulf Realty Company, 1437 Peoples Gas Building, Chicago, Illinois. Read it Carefully, then use your own Good Judgment.

* * *

Please send me your book, "Independence With Ten Acres."



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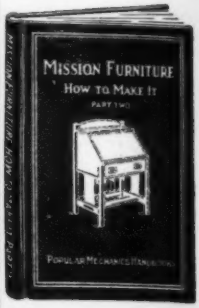

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PARTS 1, 2 and 3

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The **Mission Furniture** books describe how to make furniture for every room in the house as well as swings and chairs for the porch and lawn. Whether you need a complete set or only some special article to fill in with here and there, you will find **full directions, dimensions and working drawings** for making it in these books. The instructions are easy to follow so that even the amateur can get most satisfactory results. **Every piece of furniture** shown in the picture was **made by one of our readers** who is **strictly an amateur** with tools. He experienced no difficulty in the work and was so well pleased that he took this photograph which he has kindly allowed us to use.

The Designs are Attractive and of Most Approved Patterns and Comprise the Following:

Book Part 1

Dining Chair — Lamp Stand and Shade—Porch Chair — Tabouret — Morris Chair — Book Rack — Library Table — Candlestick — Novelty Chair—Magazine Stand — Lawn Swing — Combination Billiard Table and Davenport — Book Shelves — Blacking Case Tabouret — Roll Top Desk — Roman Chair-Settee—Pyrographer's Table — Piano Bench — Shaving Stand — Waste Paper Basket—Cellarette Pedestal — Princess Dresser — Sideboard — Hall or Window-Seat — Plant Stand — Bedside Medicine Stand — Hall Chair.

Book Part 2

Two China Closets—Two Arm Chairs — Rocker — Side Chair — Mantel Clock — Lamp Stand — Two Foot Stools—Bookcase—Magazine Table—Smoking Stand — Wall Case — Waste Paper Basket — Music Stand — Hall Clock—Cedar Chest —Child's Dresser—Couch —Oil Lamp—Grill—Two Writing Desks—Library Set—Buffet—Bedstead—Dining Table—Medicine Cabinet — Telephone Stand — Plate Rack — Dining Room Shade.

Book Part 3—Just Published

Arm Chair—Arm Dining Chair—Hall Bench—Piano Bench —Book Rack—Book Stand and Music Rack—Book Trough—Chafing Dish Buffet—Folding Card Table—Side Chair—Writing Desk—Dictionary and Magazine Stand — Round Dining Table—Princess Dresser—Fern Stand—Foot Warmer —Hall Tree—Library Table—Magazine Rack—Magazine Stand — Pedestal — Plate Rack—Porch Swing — Screen — Serving Table—Settee—Sewing Table—Sewing Box—Wall Shelf — Sideboard — Umbrella Stand — Den Table — Oak Table — Tabouret — Wardrobe — Window Seat.

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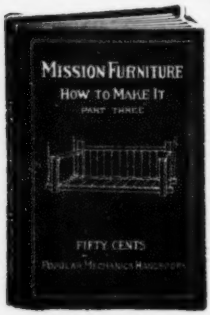

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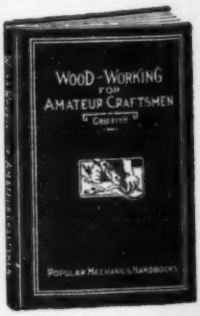

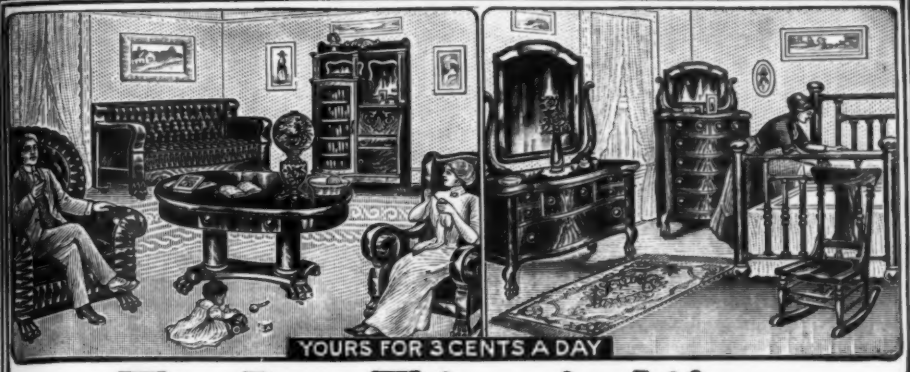

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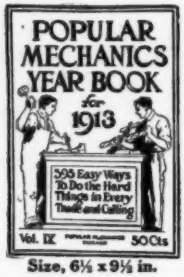

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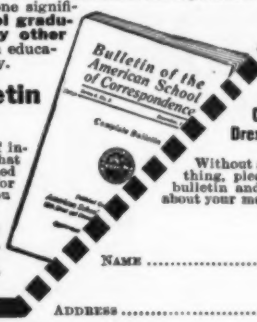

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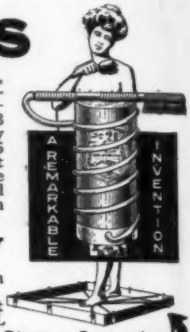

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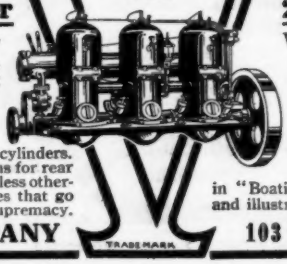

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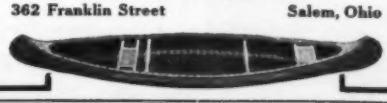

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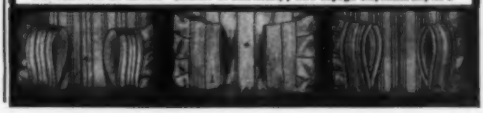

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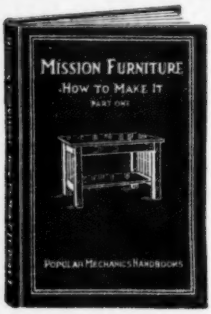

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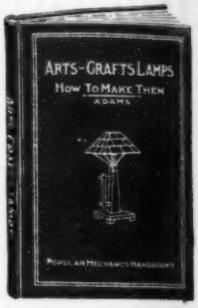

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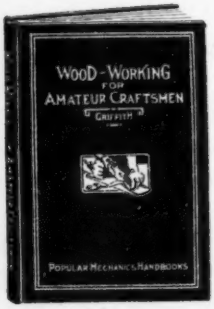

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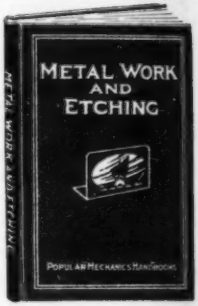

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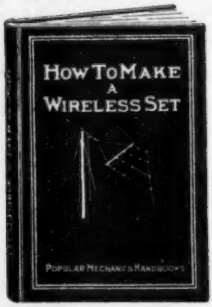

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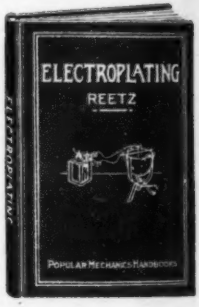

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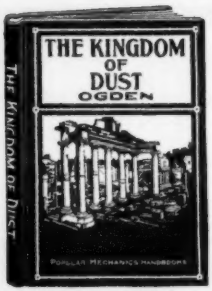

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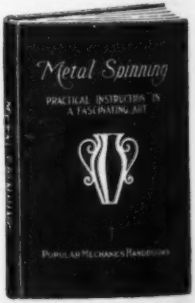

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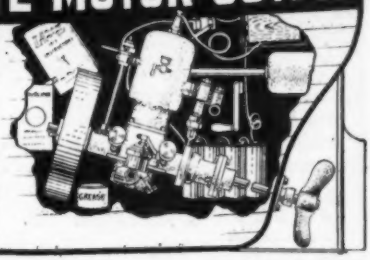

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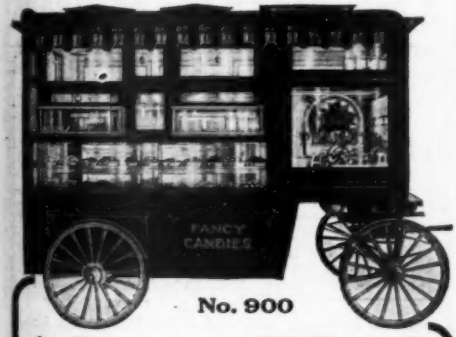

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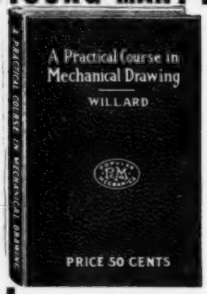

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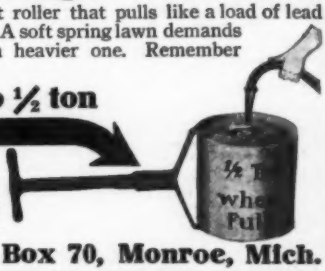

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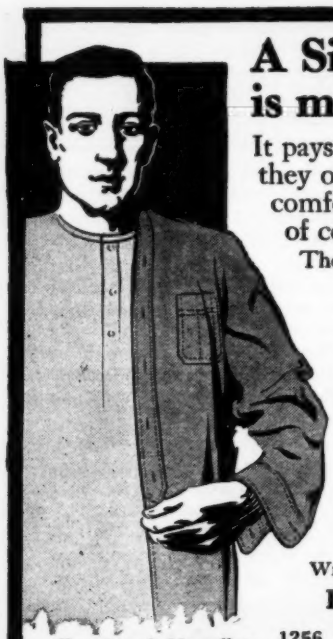

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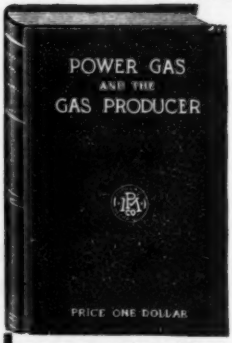

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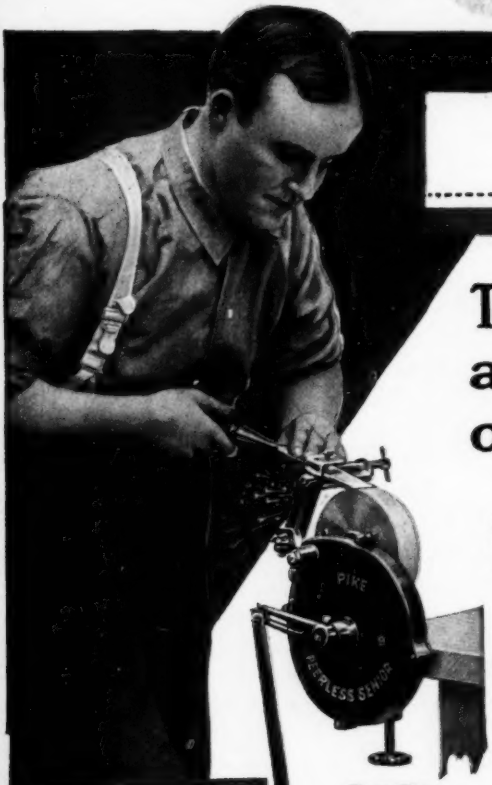

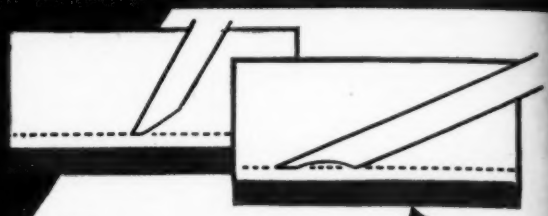

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